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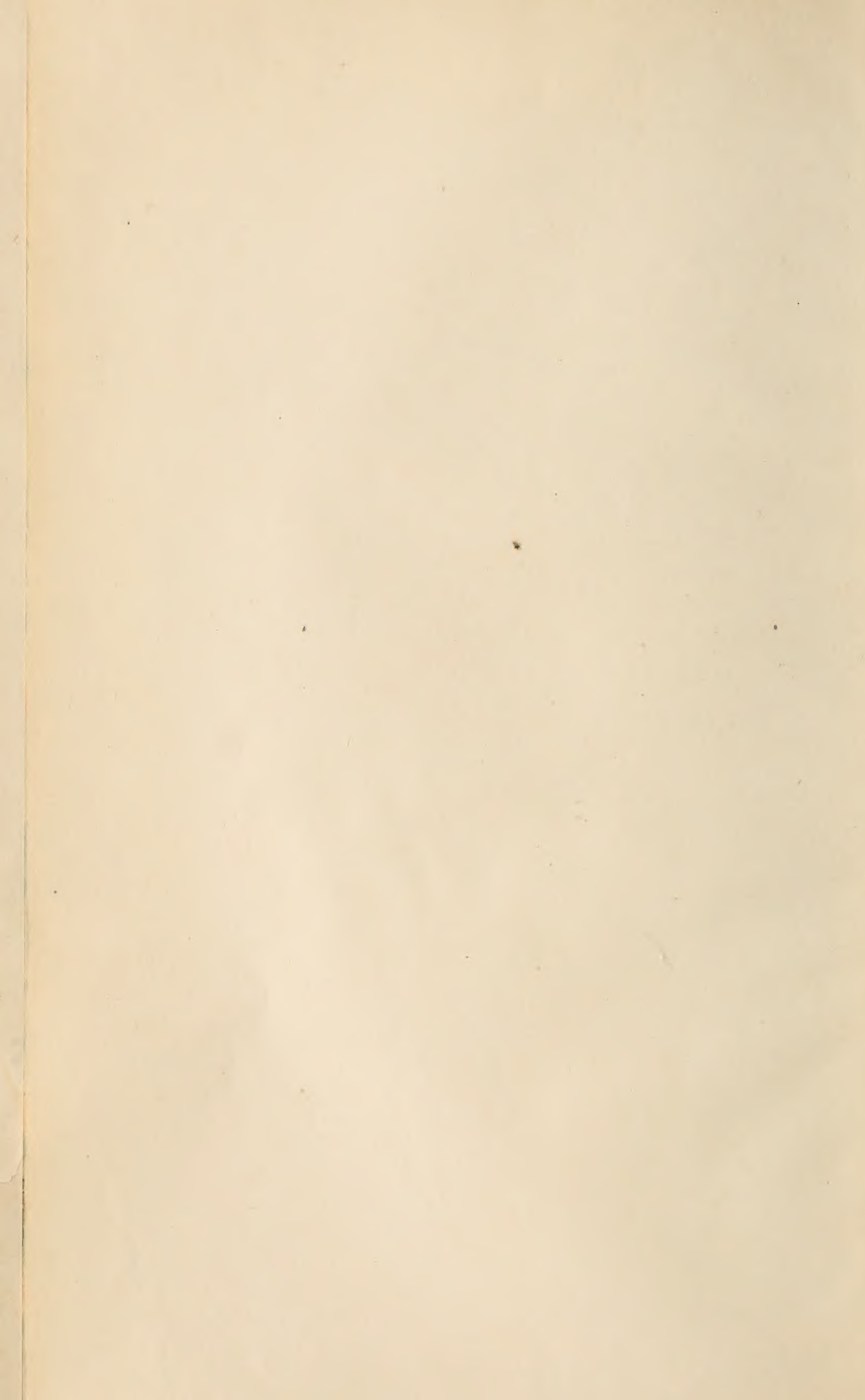
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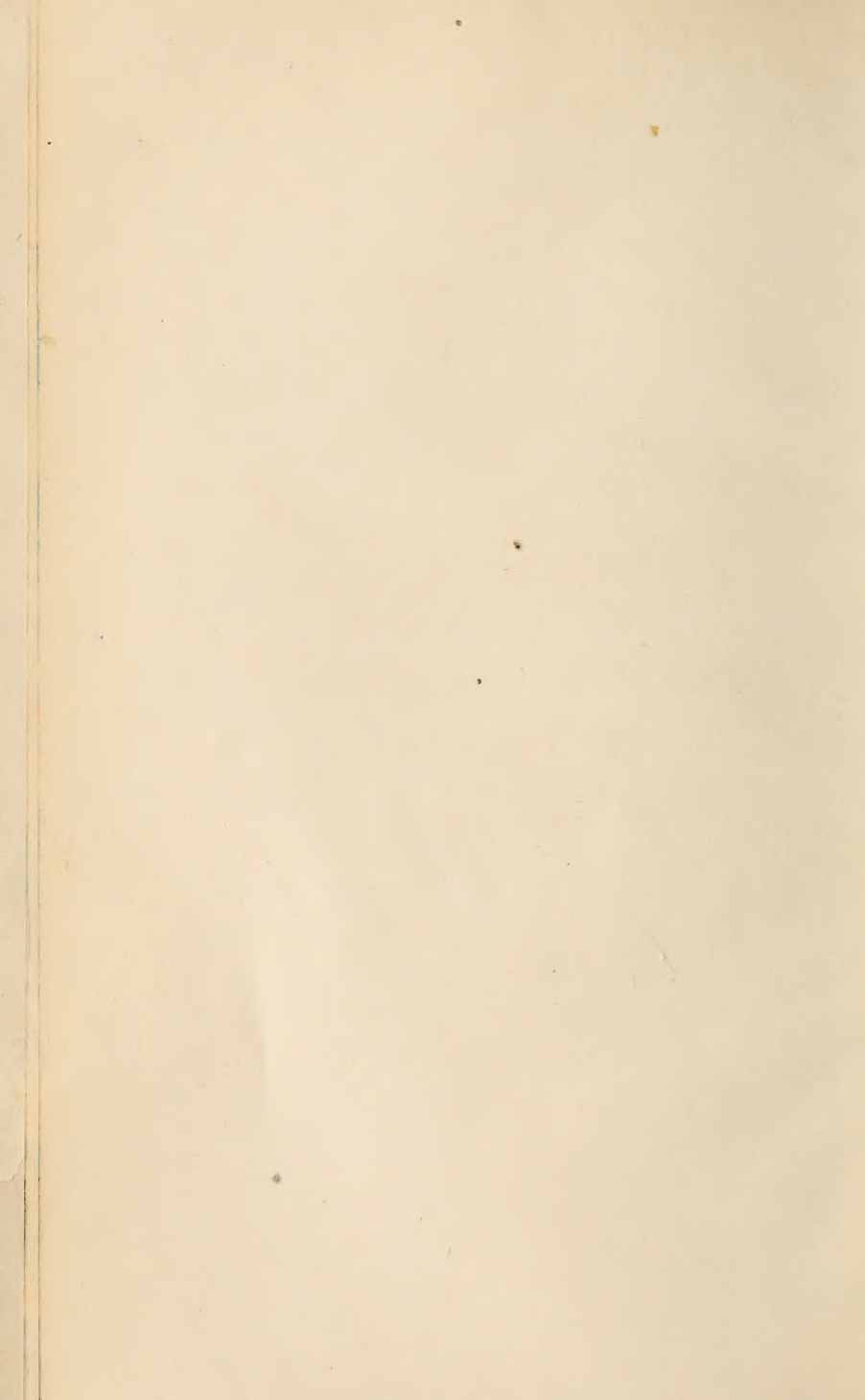
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THE
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OF THE
ROYAL AGRICULTURAL SOCIETY
OF ENGLAND.

SECOND SERIES.—VOL. XXV.

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THE
JOURNAL
OF THE
ROYAL AGRICULTURAL SOCIETY
OF ENGLAND.

SECOND SERIES.

VOLUME THE TWENTY-FIFTH.

PRACTICE WITH SCIENCE.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1889.

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2nd series
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THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY; STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN. HE WHO ACCOMPLISHES BUT ONE OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS.

VON THAER, *Principles of Agriculture.*

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DIRECTIONS TO THE BINDER.

The Binder is desired to collect together all the Appendix matter, with roman numeral folios, and place it at the *end* of each volume of the Journal, excepting Titles and Contents, and Statistics &c., which are in all cases to be placed at the *beginning* of the Volume; the lettering at the back to include a statement of the *year* as well as the *volume*; the first volume belonging to 1839-40, the second to 1841, the third to 1842, the fourth to 1843, and so on.

In Reprints of the Journal all Appendix matter and, in one instance, an Article in the body of the Journal (which at the time had become obsolete) were omitted; the roman numeral folios, however (for convenience of reference), were reprinted without alteration in the Appendix matter retained.

NOTICE.

The present number completes the Second Series of the Journal, which was commenced in the year 1865.

A complete Index to the Series is in course of preparation, and will be shortly issued.

STATISTICS

AFFECTING BRITISH AGRICULTURAL INTERESTS.

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METEOROLOGY IN 1888.¹

First Quarter.—The weather in *January* was dry and generally fine. The temperature of the air was above its average from the 2nd to the 15th, and from the 21st to the 26th, and below at other times. Fog was very prevalent at many places from the 9th to the 14th, the fall of rain was small, and snow fell generally towards the end of the month. Streams and springs were very low.

The weather in *February* was dry, cold, and cheerless. The temperature of the air from the 4th to the 10th was mild, with fine weather; and very cold, with temperature below the average, on all other days. The rainfall was small, and all brooks and streams were low. Snow fell generally throughout the month, particularly about the middle, with a rough wind causing great drifts.

The month of *March* was cold, wintry, and ungenial. The temperature of the air was a little above the average on the five days from the 7th to the 11th, and below on every other day. The period from February 11th to March 6th was very severe, its mean value was 31.5° ; for a temperature approaching this we must go back to 1855, when the mean temperature of the same days was 32.2° , and there is no instance of a lower temperature back to 1814. Snow fell very frequently throughout the month.

Second Quarter.—The weather in *April* was for the most part fine and cold. The first twelve days were very cold, particularly from the 3rd to the 10th, the temperature of those days being more than 10° below the average, with a strong N. and E. wind blowing; from the 13th to the 18th the days were warm; but from the 19th to the end of the month cold. The fall of rain was generally below its average; vegetation backward.

The weather in *May* was upon the whole fine, with very cold nights at the beginning of the month, and a good deal of N. and E. winds. The only warm period in the month was from the 17th to the 21st, and generally on other days it was cold. The fall of rain was small, being about one-third of its average.

The weather in *June* after the first few days was generally cold and cheerless. The temperature till the 4th was warm, and was, with the exception of a few days, below its average from the 5th to the end of the month. The fall of rain was above its average at some places, and less than its average at other places. The water supply in the North was deficient, and in some places in Lancashire the want of rain was felt severely.

Third Quarter.—The weather in *July* was remarkably cold and wet, it was ungenial throughout, with very little sunshine. The temperature was below its average on nearly every day, and on a few days was as much as 15° below the average; the month was colder than any July back to 1860. The fall of rain at Greenwich was 6.75 inches, and only once back to 1815 has this fall in July been exceeded, viz. in 1828, when it was 7.00 inches.

¹ Abstracted from the particulars supplied to the Registrar-General by James Glaisher, Esq., F.R.S., &c.

The weather in *August* was also wet, cold, gloomy, and cloudy. The only period of moderate warmth was the six days from the 7th to the 12th, and at all other times it was cold. The fall of rain about London was a little above the average, but was generally less than the average at the other stations. The want of sunshine prevented fruits ripening, and was most unfavourable for harvest operations.

The month of *September* was dry, the first ten days were moderately warm, but generally cold afterwards; the middle fortnight was fine and pleasant. The fall of rain was below its average at all stations. The mean temperature of the month was 55·7°.

Fourth Quarter.—The weather in *October* was remarkably severe till the 25th, with frosts in the morning and small rainfall. The temperature was below its average on every day till the 24th, and particularly during the first ten days—on some of these days the temperature of the air was as much as 14° or 15° below their averages. The end of the month from the 25th was warm. The month was fine and dry.

The month of *November* was for the most part cloudy, mild, and wet. The temperature was generally below its average till the 10th, and above it from the 11th. The fall of rain was above its average.

The month of *December* was cloudy and mild till the 8th, from the 9th to the 18th it was cold, dry, and frosty, and from the 19th it was again mild, with rain. The temperature of the air was below its average from the 9th to the 18th, and on the last two days, and above it on the remaining days. The fall of rain was a little above its average at some places, and below it at others. Fogs were prevalent, and some were very dense.

Wind Observations.—The average duration of the different directions of the wind at eight points of the compass in each month of 1888, at the Royal Observatory, Greenwich, was as follows:—

Months	Direction of Wind							
	N.W.	N.	N.E.	E.	S.E.	S.	S.W.	W.
	days	days	days	days	days	days	days	days
January .	4	2	5	2	5	2	9	2
February .	5	5	9	2	1	0	4	3
March .	5	4	4	2	2	1	10	3
April . .	4	5	6	2	0	3	8	2
May . .	2	3	8	1	2	2	11	2
June . .	2	6	5	1	1	2	11	2
July . .	5	3	2	1	1	2	15	2
August .	3	2	5	0	1	0	18	2
September	6	3	8	1	0	2	9	1
October .	9	2	6	1	1	1	10	1
November	1	0	2	2	12	1	11	1
December	2	1	2	1	7	7	10	1
Totals for 1888 }	48	36	62	16	33	23	126	22

The following Table (I.) gives the Meteorological Observations recorded at the Royal Observatory, Greenwich, for each month of the year 1888:—

TABLE I.—METEOROLOGICAL OBSERVATIONS RECORDED AT

1888.	TEMPERATURE OF										ELASTIC FORCE OF VAPOUR	WEIGHT OF VAPOUR IN A CUBIC FOOT OF AIR	
	AIR			EVAPORA- TION		DEW POINT		AIR—DAILY RANGE					
	MONTHS	Mean	Diff. from aver- age of 116 years	Diff. from aver- age of 46 years	Mean	Diff. from aver- age of 46 years	Mean	Diff. from aver- age of 46 years	Mean	Diff. from aver- age of 46 years	Mean	Diff. from aver- age of 46 years	Mean	Diff. from aver- age of 46 years
Jan.	37·8	+1·2	-0·6	36·3	-0·6	34·4	-0·5	8·0	-1·5	199	-·001	2·4	0·0
Feb.	35·0	-3·8	-4·5	32·8	-5·2	29·3	-6·0	8·5	-2·6	162	-·047	2·0	-0·4
March	38·0	-3·1	-3·6	35·7	-3·4	32·7	-3·2	11·4	-3·3	186	-·030	2·2	-0·3
Means	36·9	-1·9	-2·9	34·9	-3·1	32·1	-3·2	9·3	-2·5	182	-·026	2·2	-0·2
April	43·4	-2·7	-2·6	40·7	-3·2	37·5	-2·9	16·2	-2·2	224	-·028	2·6	-0·3
May	53·0	+0·5	+0·5	48·0	-0·8	43·0	-2·0	22·1	+1·7	277	-·021	3·1	-0·3
June	58·3	0·0	-0·6	54·4	-0·1	50·9	+0·3	19·4	-1·6	373	+·003	4·2	0·0
Means	51·6	-0·7	-0·9	47·7	-1·4	43·8	-1·5	19·2	-0·7	291	-·015	3·3	-0·2
July	57·9	-3·8	-4·4	55·2	-2·5	52·8	-1·2	15·7	-5·3	400	-·018	4·5	-0·3
August	54·1	-1·8	-2·4	55·7	-1·7	52·7	-1·2	18·5	-1·4	399	-·019	4·5	-0·3
Sept.	55·7	-0·2	-1·3	53·1	-0·8	50·7	-0·4	17·0	-1·2	370	-·009	4·2	-0·1
Means	57·6	-2·1	-2·7	54·7	-1·7	52·1	-0·9	17·1	-2·6	390	-·015	4·4	-0·2
October	46·0	-3·5	-3·9	43·9	-3·9	41·6	-4·3	17·5	+3·0	263	-·046	3·1	-0·9
Nov.	47·0	+4·6	+3·6	45·3	+3·9	43·3	+3·9	8·8	-2·6	380	+·035	3·3	+0·3
Dec.	40·8	+1·7	+1·0	39·7	+1·3	38·3	+1·8	10·0	+0·7	231	+·013	2·7	0·0
Means	44·6	+0·9	+0·2	43·0	+0·4	41·1	+0·5	12·1	+0·4	258	+·001	3·0	-0·2

NOTE.—In reading this table it will be borne in mind that the *plus* sign (+)

THE ROYAL OBSERVATORY, GREENWICH, FOR THE YEAR 1888.

DEGREE OF HUMIDITY		READING OF BAROMETER		WEIGHT OF A CUBIC FOOT OF AIR		RAIN		Daily hori- zontal move- ment of the air	READING OF THERMOMETER ON GRASS					1888		
									Number of nights it was			Lowest reading at night	Highest reading at night			
Mean Saturation = 100	Diff. from aver- age of 46 years	Mean	Diff. from average of 46 years	Mean	Diff. from average of 46 years	Amount	Diff. from average of 72 years	Miles	At or below 30°	Between 30° and 40°	Above 40°					MONTHS
88	+	1	30·053	+	·303	560	+6	0·89	-1·00	296	16	15	0	14·3	38·7	Jan.
79	-	6	29·777	-	·020	558	+5	0·89	-0·68	386	18	11	0	10·8	36·0	Feb.
81		0	29·432	-	·345	548	-2	2·78	+1·26	377	17	12	2	19·8	42·7	Mar.
83	-	2	29·754	-	·021	555	+3	Sum 4·56	Sum -0·42	Mean 353	Sum 51	Sum 38	Sum 2	Lowest 10·8	Highest 42·7	Means
79	-	1	29·707	-	·041	547	+4	1·51	-0·23	325	14	12	4	18·6	42·6	April
69	-	10	29·879	+	·091	540	0	0·64	-1·34	317	6	18	7	26·7	53·2	May
76	+	1	29·752	-	·059	530	-2	3·35	+1·39	214	0	4	26	36·6	55·0	June
75	-	3	29·779	-	·003	539	+1	Sum 5·50	Sum -0·18	Mean 295	Sum 20	Sum 34	Sum 37	Lowest 18·6	Highest 55·0	Means
83	+	8	29·600	-	·197	529	+1	6·75	+4·25	202	0	1	30	39·0	54·1	July
80	+	4	29·832	+	·048	531	+2	3·73	+1·38	273	0	6	25	38·5	54·7	Aug.
85	+	4	29·968	+	·170	538	+5	0·73	-1·70	222	0	13	17	30·0	56·6	Sept.
83	+	5	29·800	+	·007	533	+3	Sum 11·21	Sum +3·93	Mean 232	Sum 0	Sum 20	Sum 72	Lowest 30·0	Highest 56·6	Means
85	-	4	29·888	+	·176	547	+7	1·30	-1·46	218	18	7	6	21·7	49·4	Oct.
87	-	3	29·624	-	·113	541	-7	4·00	+1·64	390	3	17	10	28·3	48·0	Nov.
91	+	1	29·809	+	·022	552	0	0·92	-1·07	240	16	9	6	16·7	43·8	Dec.
88	-	2	29·774	+	0·28	547	0	Sum 6·22	Sum -0·89	Mean 283	Sum 37	Sum 33	Sum 22	Lowest 16·7	Highest 49·4	Means

signifies above the average, and that the minus sign (-) signifies below the average.

TABLE II.—HAY HARVEST FORECASTS, 1888.

RETURN SHOWING THE NUMBER OF FORECASTS SENT TO EACH OF THE UNDERMENTIONED DISTRICTS, WITH THE RESULTS OF THE FORECASTS.

Districts	Names of Stations	Forecasts		Percentages				Total percentage of Success
		Number sent	Number checked	Complete Success	Partial Success	Partial Failure	Total Failure	
Scotland, N.	Golspie and Munloch	67	67	48	34	17	1	82
Scotland, E.	{ Glamis, North Berwick, Rotherham, and Aberfeldy }	117	108	43	41	11	5	84
England, N.E.	Chatton and Ulceby	65	66	50	27	17	6	77
England, E.	Thorpe and Rothamsted	72	53	48	39	10	3	87
Midland Counties	{ Cirencester and East Retford }	66	38	53	32	9	6	85
England, S.	{ Maidstone, Downton, and Horsham }	126	103	52	40	6	2	92
Scotland, W.	{ Dumbarton, Stranraer, and Islay }	93	92	45	41	8	6	86
England, N.W.	Leyburn, and Prescott	66	65	57	24	11	8	81
England, S.W.	{ Bridgend (Glamorgan), Spring Park (Gloucestershire), Clifton, and Glastonbury }	141	147 (sic)	46	36	13	5	80
Ireland, N.	{ Moynalty and Hollymount }	64	58	43	38	14	5	81
Ireland, S.	{ Moneygall, Kilkenny, and Ardert Abbey }	102	102	53	31	10	6	84
Mean for all Districts		.	.	49	35	11	5	84

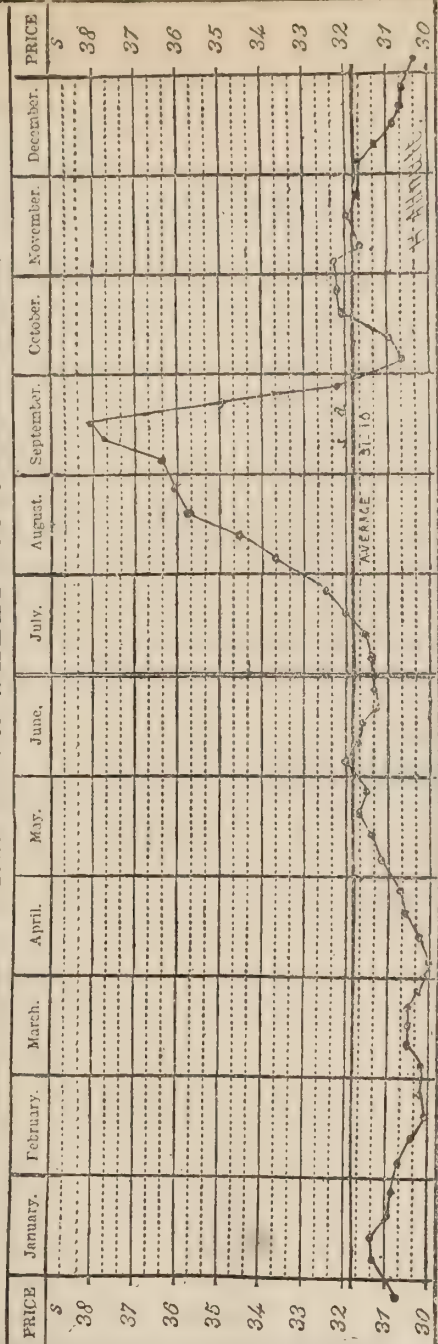
NOTE.—Mr. Frederick Gaster, in forwarding the detailed results of the checking of the "Hay Harvest Forecasts for 1888" to the Secretary of the Meteorological Council, remarks, *inter alia* :—

The telegrams were transmitted daily between 3.30 P.M. and 4 P.M. on each week-day for about five weeks, beginning on June 11 in England, South and East, and ending on August 25 over the greater part of Scotland. The general percentage of successful forecasts (84), though, as might be expected, lower than in 1887, was nevertheless as high as in the fine season of 1886, and higher than in 1885. The largest general percentage (92) was reached in England S., while the smallest (77) was in England N.E.; the relatively low percentage in the latter district is not easily explained. In addition to the above there were sent similar telegrams to seven other gentlemen, at their own cost, for periods of varying length. Colonel Turbervill had the forecasts continued at his own expense during the corn harvest, and four other gentlemen asked for a continuance of the telegrams. One of the subscribers, Mrs. Fergusson, of Thetford, says the forecasts have been very correct. When it is borne in mind how very wet and changeable the season was when compared with that of 1887, it appears that the falling off in the percentage of success this year was smaller than might have been expected.

Some of the recipients have voluntarily borne testimony to the success of the forecasts. The Rev. Dr. Joass, of Golspie, remarks that "the forecasts were much appreciated." Mr. Turner, of Ulceby, says "the telegrams have been appreciated." Mr. Wray, of Leyburn, asked for a continuance, and said "the forecasts had been generally correct, and much appreciated." Mr. Neville Grenville, of Butleigh Court, requested a continuance, and remarked, "So far they have been excellent, and people take great interest in them." Mr. Milward, of Lavistoun, Kilkenny, says, "They have been very correct."

The Annual Imperial average price of Wheat has declined 8*d.* a quarter from 1887. In that year it was 32*s.* 6*d.*, and in the past year 31*s.* 10*d.* The fluctuations, however, have been very different, which will be seen on comparing the diagram of 1888 with 1887. A considerable rise took place in September last; from 31*s.* 5*d.* the first week in July, the weekly average rose to 38*s.* 1*d.* on the 15th September, and then fell 3*s.* in one week, and another 3*s.* the following week, and afterwards 1*s.* 7*d.*, down to 30*s.* 7*d.* the 6th October. The price of Barley presents some curious features. On the 7th April last the weekly average was 1*s.* above Wheat, the former was 2*s.* 11*d.* under Wheat; and the latter 30*s.* a quarter. Again, on May 12, Barley was 11*d.* above Wheat; but on July 21, Barley was 2*s.* 11*d.* under Wheat; on August 25 Barley was 14*s.* 2*d.* below Wheat, and after September to the end of the year it was 2*s.* or 3*s.* under Wheat. The highest weekly average price of Wheat was 38*s.* 1*d.* on September 15, and the lowest 30*s.* on April 7. The weekly average therefore ranged 8*s.* 1*d.*; in 1887 it was 7*s.* 11*d.* The Annual Imperial average price of Corn was—Wheat, 31*s.* 10*d.*, Barley 27*s.* 10*d.*, and Oats 16*s.* 9*d.* The Septennial Tithe Rent Charge is 3*l.* 3*s.* 0*d.* per 100*l.* lower this year than last, it being 80*l.* 1*s.* 8*d.* The average from the Commutation in 1836 is 101*l.* 10*s.* 11*d.*

1893.—WEEKLY AVERAGE PRICE OF WHEAT FROM GOVERNMENT RETURNS.



The space between each horizontal line indicates four pence.

JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	AVERAGES FOR 1888.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
7, 31 3	4, 30 8	3, 30 2	7, 30 0	5, 31 2	2, 32 0	7, 31 5	4, 33 8	1, 36 4	6, 30 7	3, 32 3	1, 31 8	Wheat . . 31 10
14, 31 4	11, 30 5	10, 30 6	14, 30 3	12, 31 5	19, 31 8	14, 31 6	11, 34 6	8, 37 9	13, 30 11	10, 31 8	8, 31 3	Barley . . 27 10
21, 30 11	18, 30 1	17, 30 6	21, 30 7	19, 31 8	16, 31 7	21, 32 0	18, 35 9	15, 38 1	20, 32 1	17, 31 11	15, 30 10	Oats . . . 16 9
28, 30 10	25, 30 2	24, 30 6	28, 30 9	26, 31 6	23, 31 3	28, 32 6	25, 36 1	23, 34 11	27, 32 2	24, 31 9	22, 30 8	
		31, 30 3			30, 31 4			29, 32 2			29, 30 7	

TABLE IV.—ESTIMATED TOTAL PRODUCE AND YIELD PER ACRE OF EACH GRASS, AND NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS, IN
[From Returns of Agricultural

DESCRIPTION OF CROPS	Great Britain								
	Acreage, 'thousands' (000) omitted			Produce of crops, 'thousands' (000) omitted			Yield per acre		
	1886	1887	1888	1886	1887	1888	1886	1887	1888
CORN CROPS :—	Acres	Acres	Acres	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
Wheat	2,286	2,317	2,564	61,468	74,323	71,940	26·9	32·0	28·0
Barley or Bere	2,241	2,035	2,086	72,090	65,301	68,482	32·2	31·3	32·8
Oats	3,082	3,088	2,882	116,596	107,283	107,344	37·8	34·7	37·2
Rye	56	55	75	—	—	—	—	—	—
Beans	381	371	339	10,307	8,339	9,725	27·0	22·5	28·7
Peas	214	230	242	5,855	5,608	5,846	27·3	24·4	24·2
TOTAL CORN CROPS	8,260	8,146	8,188	—	—	—	—	—	—
GREEN CROPS :—				Tons	Tons	Tons	Tons	Tons	Tons
Potatoes	554	560	590	3,168	3,565	3,059	5·7	6·4	5·2
Turnips and Swedes	2,003	1,972	1,944	29,983	19,748	24,675	15·0	10·0	12·7
Mangold	349	361	361	7,280	5,423	6,239	20·8	15·0	17·8
Carrots and Parsnips	16	16	18	—	—	—	—	—	—
Cabbage, Kohl-rabi, and Rape	152	154	160	—	—	—	—	—	—
Vetches, Lucerne, and any other crop (except clover or grass) }	406	401	399	—	—	—	—	—	—
TOTAL GREEN CROPS	3,480	3,464	3,472	—	—	—	—	—	—
OTHER CROPS, GRASS, &c. :—									
Clover and artificial and other grasses under rotation, including permanent pasture, or grass not broken up in rotation (exclusive of heath or mountain land) }	13,555	13,565	13,401	—	—	—	—	—	—
Ditto under meadow for hay	6,670	6,887	7,069	9,075	7,894	9,952	—	—	—
Flax	3	4	2	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
Hops	70	64	58	776	458	281	11·1	7·2	4·8
TOTAL OTHER CROPS	20,298	20,520	20,530	—	—	—	—	—	—
DESCRIPTION OF LIVE STOCK :—	Year 1886			Year 1887			Year 1888		
	Actual No.			Actual No.			Actual No.		
Horses	1,425,359			1,428,883			1,420,350		
Cattle	6,646,683			6,441,268			6,129,375		
Sheep	25,520,718			25,958,788			25,287,149		
Pigs	2,221,475			2,299,323			2,404,344		

NOTE.—The produce of the Corn Crops for Ireland, which was originally given in weight, has been converted and 60 lbs. to the bushel of Beans and Peas.

OF THE PRINCIPAL CROPS, AND ALSO THE ACREAGE UNDER OTHER CROPS AND GREAT BRITAIN AND IRELAND, IN EACH OF THE YEARS 1886-88.

Department of Privy Council.]

Ireland									United Kingdom								
Acreage, 'thousands' (000) omitted			Produce of crops, 'thousands' (000) omitted			Yield per acre			Acreage, 'thousands' (000) omitted			Produce of crops, 'thousands' (000) omitted			Yield per acre		
1886	1887	1888	1886	1887	1888	1886	1887	1888	1886	1887	1888	1886	1887	1888	1886	1887	1888
Acres	Acres	Acres	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Acres	Acres	Acres	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
70	67	99	1,880	1,902	2,553	27.0	28.3	25.8	2,355	2,385	2,663	63,348	76,225	74,193	26.9	32.0	28.0
182	162	171	6,219	4,647	6,063	34.2	28.6	35.4	2,123	2,248	2,257	78,310	69,948	74,515	32.3	31.1	33.0
1,322	1,315	1,281	52,780	43,506	50,632	40.0	33.1	39.5	4,104	4,403	4,163	169,376	150,789	157,976	38.5	34.3	38.0
11	11	14	—	—	—	—	—	—	67	66	89	—	—	—	—	—	—
6	6	5	183	134	119	30.5	21.1	23.5	387	377	344	10,490	8,473	9,844	27.1	22.3	28.6
1	1	1	18	16	16	26.2	23.1	22.1	215	230	242	5,873	5,623	5,862	27.3	24.4	24.2
1,592	1,562	1,571	—	—	—	—	—	—	9,851	9,709	9,758	—	—	—	—	—	—
800	797	805	Tons	Tons	Tons	Tons	Tons	Tons	1,554	1,357	1,395	Tons	Tons	Tons	Tons	Tons	Tons
299	300	294	3,975	2,719	3,327	13.3	9.1	11.3	2,302	2,272	2,238	33,957	22,467	28,002	14.7	9.9	12.5
37	42	46	506	455	590	13.5	10.9	12.9	387	402	407	7,786	5,878	6,329	20.1	14.6	16.8
3	3	3	—	—	—	—	—	—	20	19	21	—	—	—	—	—	—
46	50	49	—	—	—	—	—	—	198	204	209	—	—	—	—	—	—
36	37	37	—	—	—	—	—	—	442	438	436	—	—	—	—	—	—
1,221	1,229	1,234	—	—	—	—	—	—	4,703	4,692	4,706	—	—	—	—	—	—
10,160	10,052	9,905	—	—	—	—	—	—	23,718	23,617	23,306	—	—	—	—	—	—
2,094	2,144	2,222	4,429	3,599	5,181	—	—	—	8,760	9,031	9,291	13,503	11,493	15,133	—	—	—
128	130	114	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	131	134	116	—	—	—	Cwt.	Cwt.	Cwt.
—	—	—	412	303	—	3.8	2.3	—	70	64	58	776	458	281	11.1	7.2	4.8
12,382	12,326	12,241	—	—	—	—	—	—	32,679	32,846	32,771	—	—	—	—	—	—
Year 1886			Year 1887			Year 1888			Year 1886			Year 1887			Year 1888		
Actual No.			Actual No.			Actual No.			Actual No.			Actual No.			Actual No.		
492,831			499,330			507,201			1,918,190			1,927,713			1,927,551		
4,184,027			4,157,409			4,099,241			10,830,710			10,598,677			10,228,616		
3,367,722			3,378,417			3,626,780			28,888,440			29,337,185			28,883,929		
1,263,133			1,408,485			1,397,800			3,484,608			3,707,808			3,802,144		

into bushels, at the rate of 60 lbs. to the bushel of Wheat; 50 lbs. to the bushel of Barley; 39 lbs. to the bushel of Oats; ¹ Turnips only.

² Including Beetroot.

TABLE V.—AVERAGE PRICES OF BRITISH CORN PER QUARTER (Imperial measure) as received from the Inspectors and Officers of Excise according to the Act of 27 & 28 Vict. ch. 87, in each week of the year 1888; and also in each of the twenty years 1869–88.

[From the "London Gazette."]

Week ending	Wheat	Barley	Oats	Week ending	Wheat	Barley	Oats
1888	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	1888	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
January 7 .	31 3	29 5	16 1	July 7 .	31 5	25 0	18 0
January 14 .	31 4	30 9	15 11	July 14 .	31 6	28 0	16 8
January 21 .	30 11	30 2	16 1	July 21 .	32 0	19 1	17 4
January 28 .	30 10	30 10	15 10	July 28 .	32 6	25 1	17 0
February 4 .	30 8	30 6	16 0	August 4 .	33 8	19 4	18 6
February 11 .	30 5	30 1	15 10	August 11 .	34 6	24 9	18 0
February 18 .	30 1	30 1	15 10	August 18 .	35 9	18 8	18 9
February 25 .	30 2	29 3	16 0	August 25 .	36 1	21 11	20 9
March 3 .	30 2	29 9	15 10	September 1 .	36 4	26 10	19 9
March 10 .	30 6	29 7	15 10	September 8 .	37 9	24 2	18 10
March 17 .	30 6	30 3	15 8	September 15 .	38 1	29 9	18 9
March 24 .	30 6	29 6	15 5	September 22 .	34 11	32 5	17 2
March 31 .	30 3	29 7	15 11	September 29 .	32 2	29 4	16 4
Average of Winter Quarter }	30 7	30 0	15 10	Average of Summer Quarter }	34 4	24 11	18 2
April 7 .	30 0	31 0	15 8	October 6 .	30 7	29 1	16 3
April 14 .	30 3	29 6	15 11	October 13 .	30 11	29 1	16 4
April 21 .	30 7	29 9	15 11	October 20 .	32 1	28 10	16 10
April 28 .	30 9	31 3	16 3	October 27 .	32 2	29 5	16 5
May 5 .	31 2	30 6	16 4	November 3 .	32 3	28 10	16 5
May 12 .	31 5	32 4	16 6	November 10 .	31 8	28 2	16 2
May 19 .	31 8	31 7	16 10	November 17 .	31 11	27 10	16 9
May 26 .	31 6	27 10	16 11	November 24 .	31 9	27 8	16 8
June 2 .	32 0	28 1	17 1	December 1 .	31 8	27 4	16 9
June 9 .	31 8	24 8	16 7	December 8 .	31 3	27 4	16 9
June 16 .	31 7	25 3	17 3	December 15 .	30 10	27 1	16 10
June 23 .	31 3	20 3	17 4	December 22 .	30 8	26 11	16 3
June 30 .	31 4	23 8	17 3	December 29 .	30 7	26 10	16 3
Average of Spring Quarter }	31 2	28 4	16 7	Average of Autumn Quarter }	31 4	28 0	16 6

ANNUAL AVERAGES FOR YEARS 1869 TO 1888.

Year	Wheat	Barley	Oats	Year	Wheat	Barley	Oats
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>		<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1869	48 2	39 5	26 0	1879	43 10	34 0	21 9
1870	46 11	34 7	22 10	1880	44 4	33 1	23 1
1871	56 8	36 2	25 2	1881	45 4	31 11	21 9
1872	57 0	37 4	23 2	1882	45 1	31 2	21 10
1873	58 8	40 5	25 5	1883	41 7	31 10	21 5
1874	55 9	44 11	28 10	1884	35 9	30 8	20 3
1875	45 2	38 5	28 8	1885	32 10	30 2	20 7
1876	46 2	35 2	26 3	1886	31 1	26 7	19 0
1877	56 9	39 8	25 11	1887	32 6	25 4	16 3
1878	46 5	40 2	24 4	1888	31 10	27 10	16 9

TABLE VI.—QUANTITIES OF BRITISH CORN sold in the Towns from which Returns are received under Acts 27 & 28 Vict. ch. 87, and 45 & 46 Vict. ch. 37, in each of the years 1879 to 1888.

[From the "London Gazette."]

Years	Wheat	Barley	Oats
	Qrs.	Qrs.	Qrs.
1879	2,022,125	1,421,244	161,693
1880	1,607,908	1,591,925	164,791
1881	1,738,255	1,631,504	211,444
1882	1,903,858	1,873,820	211,799
1883	2,901,146	2,575,528	408,471
1884	2,833,132	3,149,341	492,918
1885	2,739,515	2,765,500	393,042
1886	2,739,822	2,474,466	367,083
1887	2,495,124	2,589,667	309,478
1888	2,427,861	1,911,835	255,726

TABLE VII.—Returns published pursuant to the Corn Returns Act, 1882, and to Act of 6 & 7 Wm. IV. for *Commutation of Tithes in England and Wales*, showing what has been, during the Seven Years ending Christmas Day in each Year, the AVERAGE PRICE of an IMPERIAL BUSHEL of British Wheat, Barley, and Oats, computed from the Weekly Averages of Corn Returns in each of the years 1882–88.

[From the "London Gazette."]

Years	Average (Septennial) prices per bushel					
	Wheat		Barley		Oats	
	s.	d.	s.	d.	s.	d.
1882	5	10 $\frac{1}{2}$	4	4 $\frac{1}{2}$	2	11 $\frac{1}{4}$
1883	5	2	3	11	2	8
1884	5	4 $\frac{3}{4}$	4	1 $\frac{3}{4}$	2	9
1885	5	1 $\frac{3}{4}$	3	11 $\frac{3}{4}$	2	8 $\frac{1}{4}$
1886	4	11	3	10	2	7 $\frac{1}{2}$
1887	4	8 $\frac{1}{2}$	3	8 $\frac{1}{2}$	2	6 $\frac{1}{4}$
1888	4	5 $\frac{1}{2}$	3	7 $\frac{1}{2}$	2	5

TABLE VIII.—COMPUTED REAL VALUE OF CORN IMPORTED INTO THE UNITED KINGDOM IN EACH OF THE SEVEN YEARS 1882–88.

[From Trade and Navigation Returns.]

	1882	1883	1884	1885	1886	1887	1888
	£	£	£	£	£	£	£
Wheat . . .	34,237,099	31,431,888	19,825,021	24,066,013	17,888,155	21,335,902	21,371,331
Barley . . .	5,541,498	5,784,504	4,228,722	4,528,823	3,968,437	3,769,272	6,069,190
Oats . . .	4,603,983	5,043,011	4,195,514	4,252,135	3,974,434	3,489,818	4,588,712
Maize . . .	6,522,070	10,314,307	7,303,099	8,473,863	7,614,113	7,535,946	6,881,307
Beans and Peas .	1,637,282	2,114,289	1,820,366	1,758,105	1,512,985	1,662,992	1,625,835
Wheat Flour .	10,631,933	12,318,144	10,166,010	9,651,508	8,254,407	10,020,433	9,530,800
Other kinds of Flour)	21,966	31,038	23,970	18,811	12,899	4,934	8,046
Total of Corn	63,195,831	67,040,181	47,562,702	52,749,258	43,225,430	47,819,297	50,675,221

TABLE IX.—QUANTITIES OF WHEAT, BARLEY, OATS, PEAS, BEANS, INDIAN CORN, OR MAIZE, WHEATMEAL, AND FLOUR, IMPORTED IN THE FIVE YEARS 1884-88; ALSO THE COUNTRIES FROM WHICH THE WHEAT, WHEATMEAL, AND FLOUR WERE OBTAINED.

[From Trade and Navigation Returns.]

(Thousands ("000") omitted.)

	1884	1885	1886	1887	1888
Wheat from—	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
Russia	5,402	11,986	3,710	5,523	21,369
Germany	1,090	1,983	1,318	1,552	3,265
France	19	3	3	71	20
Turkey and Roumania . .	505	1,063	539	587	1,601
Egypt	1,000	110	41	198	730
United States	22,606	24,279	24,621	30,505	14,647
Chili	1,056	1,623	1,702	2,206	1,486
British India	8,010	12,102	11,029	8,509	8,189
Australasia	4,898	5,279	739	1,347	2,316
British North America .	1,757	1,746	3,081	3,965	1,089
Other countries	771	1,280	622	1,322	2,513
Total Wheat	47,114	61,454	47,405	55,785	57,225
Wheatmeal and Flour from—					
Germany	1,747	1,415	817	589	1,109
France	154	187	115	98	102
Austrian Territories . .	1,564	1,816	1,362	1,391	1,946
United States	10,341	11,728	11,473	14,873	12,557
British North America .	689	281	770	959	785
Other countries	609	408	202	147	414
Total Wheatmeal and Flour	15,104	15,835	14,739	18,057	16,913
Barley	12,987	15,392	13,723	14,277	21,277
Oats	12,936	13,062	13,495	14,469	18,737
Peas	1,935	2,004	2,047	2,990	2,421
Beans	3,520	3,515	2,804	2,477	3,010
Indian Corn or Maize . .	24,795	31,468	30,998	31,123	25,338
Indian Corn Meal	16	14	10	6	15

TABLE X.—FOOD IMPORTS.—VALUE PER HEAD OF POPULATION OF THE UNITED KINGDOM, OF THE SEVERAL KINDS OF AGRICULTURAL FOOD PRODUCTS IMPORTED FROM FOREIGN COUNTRIES AND BRITISH POSSESSIONS IN THE YEARS 1878-1887.

[From *Agricultural Returns of Great Britain*.]

Years	Estimated Population of United Kingdom	Farinaceous Substances		Vegetable Produce			Live and Dead Meat		Poultry, Game, and Fish	Butter, Cheese, Eggs, &c.	Total of all kinds
		Corn, Flour, and Meal	Rice, Sago, &c.	Sugar, Hops, and Malt	Fruit and Vegetables	Live Cattle, Sheep, and Pigs	Dead Meat, Bacon, and Hams				
1878	33,943,773	£ s. d. 34 10	£ s. d. 2 4	£ s. d. 12 9	£ s. d. 4 1	£ s. d. 4 5	£ s. d. 7 7	£ s. d. 1 2	£ s. d. 11 3	£ s. d. 3 18 5	
1879	34,302,537	35 9	2 6	13 9	4 2	4 2	7 11	1 2	10 6	3 19 11	
1880	34,622,930	36 4	2 9	13 9	4 10	5 11	9 6	1 2	12 4	4 6 7	
1881	34,952,204	34 10	2 8	14 5	3 5	4 10	9 4	1 7	11 10	4 2 11	
1882	35,297,114	36 0	2 5	15 10	3 8	5 3	7 1	1 6	11 6	4 3 3	
1883	35,611,770	38 0	2 4	14 8	3 10	6 9	9 1	1 8	12 2	4 8 6	
1884	35,961,663	26 9	2 0	11 11	3 8	5 10	8 4	1 6	12 3	3 12 3	
1885	36,331,119	29 4	1 9	10 9	3 3	4 10	8 5	1 6	11 1	3 10 11	
1886	36,709,477	23 9	1 11	9 0	3 4	3 10	7 7	1 6	10 7	3 1 6	
1887	37,001,564	26 0	1 7	9 2	3 5	3 4	7 9	1 6	11 4	3 4 1	

NOTE.—This Table does not include cocoa, coffee, chicory, and tea; ale, beer, wine, and spirits; dried or preserved fruit and vegetables; confectionery, isinglass, spices, sauces, and condiments; vinegar and yeast.

TABLE XI.—FOOD PRODUCTS IMPORTED
Comparative Tables showing in each of the undermentioned years the Quantities and
[From Agricultural Returns

I.—LIVE

QUANTITIES					
	1883	1884	1885	1886	1887
	Number	Number	Number	Number	Number
Live Cattle	474,750	425,507	373,078	319,622	295,961
„ Sheep	1,116,115	945,042	750,886	1,038,965	971,404
„ Pigs	38,863	26,437	16,522	21,351	21,965
Total Live Stock	1,629,728	1,396,986	1,140,486	1,379,938	1,289,330

II.—DEAD MEAT, FISH,

	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
Beef, Mutton, and Pork (salted and fresh), Hams, &c. . .	6,050,148	5,819,351	6,712,359	6,707,082	6,573,866
Fish	1,295,754	1,336,422	1,520,570	1,679,197	1,604,667
Butter and Margarine . . .	2,334,473	2,475,436	2,401,373	2,431,540	2,789,274
Cheese	1,799,704	1,927,139	1,833,832	1,734,890	1,836,789
Lard	853,541	699,827	871,210	895,463	907,634
Poultry and Game ¹ . . .	—	—	—	—	—
Eggs	—	—	—	—	—
Total Dead Meat, &c. . .	—	—	—	—	—

III.—BREAD-STUFFS, GRAIN,

	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
Wheat and Wheat-flour . . .	80,467,943	62,401,457	77,331,707	62,125,366	73,865,752
Oats, Maize, Barley, Rye, &c. .	69,083,781	56,400,323	65,913,827	63,467,970	66,204,194
Meal of all kinds	1,211,416	798,276	766,929	467,932	895,961
Rice	7,747,725	6,579,458	5,588,650	6,557,213	5,019,512
Sago and Sago-flour	333,335	346,188	361,307	479,903	445,456
Other Farinaceous substances .	—	—	—	—	—
Sugar and Molasses	24,023,230	24,298,646	25,138,480	22,936,201	25,312,153
Hops	129,900	256,777	266,952	153,759	145,122
Malt	—	—	—	—	—
Total Bread-stuffs, &c. . .	—	—	—	—	—

IV.—FRUIT,

	Bushels	Bushels	Bushels	Bushels	Bushels
Apples, Oranges, &c. . . .	9,389,443	10,006,295	9,566,825	10,251,085	9,229,921
Onions	2,687,589	3,037,406	3,537,616	3,633,587	3,645,922
Potatoes	5,149,509	2,444,160	2,299,934	2,707,889	2,763,357
Nuts (edible), incl'g Almonds .	—	—	—	—	—
Unenumerated	—	—	—	—	—
Total Fruit, &c.	—	—	—	—	—

Summary (SEE VALUES) .

¹ Including Rabbits.

INTO THE UNITED KINGDOM.

Values of the chief Importations into the United Kingdom from Foreign Countries.
of Great Britain.]

STOCK.

VALUES

	1883	1884	1885	1886	1887
	£	£	£	£	£
Live Cattle	9,332,242	8,271,020	7,046,477	5,068,846	4,438,785
„ Sheep	2,518,382	2,149,704	1,625,029	2,010,194	1,645,839
„ Pigs	133,130	84,153	63,248	63,357	64,424
Total Live Stock	11,983,754	10,504,877	8,734,754	7,142,397	6,149,048

BUTTER, CHEESE, EGGS, &c.

	£	£	£	£	£
Beef, Mutton, and Pork (salted and fresh), Hams, &c.	16,254,964	15,025,966	15,289,718	13,899,671	14,344,295
Fish	2,301,966	2,048,800	1,994,614	2,158,323	2,032,423
Butter and Margarine	11,773,933	12,543,455	11,563,508	11,103,702	11,890,701
Cheese	4,890,400	5,001,635	4,069,344	3,871,359	4,514,382
Lard	2,247,016	1,535,123	1,606,485	1,544,632	1,604,243
Poultry and Game	591,895	670,609	655,397	639,704	722,235
Eggs	2,732,055	2,910,493	2,931,237	2,884,063	3,085,681
Total Dead Meat, &c.	40,792,229	39,736,081	38,110,303	36,101,454	38,193,960

MEAL, SUGAR, &c.

	£	£	£	£	£
Wheat and Wheat-flour.	43,799,259	30,065,577	33,736,358	26,137,681	31,365,802
Oats, Maize, Barley, Rye, &c.	23,329,559	17,629,044	19,166,457	17,183,251	16,652,966
Meal of all kinds	493,549	367,004	358,040	227,247	272,025
Rice	3,175,426	2,679,101	2,185,664	2,451,572	1,873,551
Sago and Sago-flour	219,660	195,680	182,680	228,716	194,021
Other Farinaceous substances	785,998	783,407	802,970	809,855	867,291
Sugar and Molasses	25,097,304	19,819,969	18,461,392	15,999,547	16,525,451
Hops	1,089,246	1,615,309	1,001,728	447,253	427,753
Malt	1,665	936	3,139	12,138	1,102
Total Bread-stuffs, &c.	97,991,666	73,156,027	75,898,428	63,497,260	68,179,962

VEGETABLES, &c.

	£	£	£	£	£
Apples, Oranges, &c.	3,639,266	3,908,009	3,619,788	3,635,650	3,273,904
Onions	440,452	532,007	492,328	506,710	616,750
Potatoes	1,585,260	824,205	727,806	799,265	974,904
Nuts (edible), incl'g Almonds	687,384	828,099	701,910	695,881	862,044
Unenumerated	400,786	426,970	467,287	540,670	600,293
Total Fruit, &c.	6,753,148	6,519,290	6,009,119	6,178,176	6,327,895
Total Value of Food Pro- ducts Imported	157,520,797	129,916,275	128,752,604	112,919,287	118,850,865

TABLE XII.—NUMBER AND VALUE OF LIVE CATTLE, SHEEP, AND SWINE IMPORTED
INTO THE UNITED KINGDOM IN THE UNDERMENTIONED YEARS.

[From Trade and Navigation Returns.]

		Number			Value		
		1886	1887	1888	1886	1887	1888
					£	£	£
Oxen and Bulls	From Denmark . .	31,945	25,079	27,385	410,947	295,295	334,451
	„ Germany . .	6,235	7,873	10,304	97,216	123,672	176,347
	„ Spain . .	8,461	6,653	11,484	146,798	108,428	188,614
	„ Canada . .	63,407	62,537	58,761	1,140,800	1,089,352	1,036,269
	„ United States .	113,756	94,642	142,865	2,270,831	1,849,307	2,840,911
	„ Other countries	17,556	22,438	36,467	292,295	336,601	554,245
Total . .		241,360	219,222	287,266	4,358,887	3,802,655	5,130,837
Cows	From Denmark . .	32,311	28,711	35,439	399,807	329,253	410,867
	„ Sweden . .	2,637	1,872	3,061	32,056	22,983	34,648
	„ Germany . .	2,097	2,263	4,239	31,035	32,908	66,415
	„ Canada . .	3,796	2,588	2,216	67,878	45,470	40,354
	„ United States .	175	215	630	3,352	3,567	12,415
	„ Other countries	1,937	3,117	4,139	36,921	54,882	70,283
Total . .		42,953	38,766	49,724	571,052	489,063	634,982
Calves	From Denmark . .	4,629	4,944	4,235	15,633	16,163	15,959
	„ Holland . .	30,181	32,734	35,494	121,072	129,424	128,863
	„ Canada . .	45	29	167	70	58	454
	„ United States .	2	1	—	3	5	—
	„ Other countries	451	265	202	2,155	1,437	879
Total . .		35,308	37,973	40,098	138,933	147,087	146,155
Sheep and Lambs	From Denmark . .	120,584	97,845	94,454	192,724	134,843	134,949
	„ Germany . .	339,719	321,085	299,589	632,365	554,596	536,851
	„ Holland . .	468,373	501,701	498,458	971,776	867,673	954,268
	„ Canada . .	94,343	35,473	45,339	184,050	65,738	89,272
	„ United States .	5,553	1,027	1,203	10,706	2,040	1,956
	„ Other countries	10,395	14,272	17,167	19,577	20,947	23,253
Total . .		1,038,967	971,403	956,210	2,011,198	1,645,837	1,740,549
Swine	From Denmark . .	1,802	885	16,325	5,027	2,485	56,521
	„ Holland . .	18,862	20,947	8,173	56,221	61,549	18,230
	„ Canada . .	70	3	—	210	6	—
	„ United States .	—	—	—	—	—	—
	„ Other countries	618	130	11	1,902	384	33
Total . .		21,352	21,965	24,509	63,360	64,424	74,784
Total of all kinds		1,379,940	1,289,329	1,357,807	7,143,430	6,149,066	7,727,307

TABLE XIII.—QUANTITY AND VALUE OF DEAD MEAT IMPORTED IN THE
FOUR YEARS 1885-88.

[From Trade and Navigation Returns.]

Thousands ("000") omitted.

DEAD MEAT		1885		1886		1887		1888	
		Quan- tity	Value	Quan- tity	Value	Quan- tity	Value	Quan- tity	Value
BACON :—		Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£
From United States		2,452	4,472	2,578	4,321	2,203	4,229	1,865	3,853
„ Other countries		716	1,956	678	1,822	798	2,101	989	2,540
Total		3,168	6,428	3,256	6,143	3,001	6,330	2,854	6,393
BEEF :—									
Salted	{ From United States	233	443	183	304	203	310	213	325
	„ Other countries	8	15	12	22	15	24	13	24
Total		241	458	195	326	218	334	226	349
Fresh	{ From United States	852	2,217	762	1,768	645	1,456	785	1,815
	„ Other countries	50	126	45	94	13	25	52	106
Total		902	2,343	807	1,862	658	1,481	837	1,921
HAMS :—									
From United States		783	1,984	841	1,971	814	2,097	647	1,697
„ Other countries		94	252	102	266	107	293	81	227
Total		877	2,236	943	2,237	921	2,390	728	1,924
MEAT, Unenumerated :—									
Salted or Fresh	{ From United States	3	5	2	3	6	13	3	6
	„ Other countries	27	81	40	110	41	103	53	114
Total		30	86	42	113	47	116	56	120
Preserved, other- wise than by Salting	{ From Australasia	199	473	57	136	167	387	128	267
	„ United States	261	691	293	663	228	531	263	630
	„ Other countries	67	370	80	368	124	432	151	480
Total		527	1,534	430	1,167	519	1,350	542	1,377
MUTTON, FRESH :—									
From Holland		81	240	52	131	63	152	88	190
„ Australasia		337	834	383	842	441	925	543	1,104
„ Other countries		154	409	217	432	281	500	358	647
Total		572	1,483	652	1,405	785	1,577	989	1,941
PORK :—									
Salted or Fresh (not Hams)	{ From United States	223	334	213	295	192	275	150	238
	„ Other countries	159	352	159	335	236	498	338	679
Total		382	686	372	630	428	773	488	917
TOTAL OF DEAD MEAT		6,699	15,255	6,697	13,882	6,577	14,351	6,720	14,942

TABLE XIV.—NUMBER OF BEASTS EXHIBITED, AND THE PRICES REALISED FOR THEM PER STONE, AT THE CHRISTMAS MARKETS IN EACH OF THE LAST FORTY YEARS.

[From the "Mark Lane Express."]

Years	Beasts	Prices	Years	Beasts	Prices
		<i>s. d. s. d.</i>			<i>s. d. s. d.</i>
1849	5,765	3 4—4 0	1869	6,728	3 6—6 2
1850	6,341	3 0—3 10	1870	6,425	3 6—6 2
1851	6,103	2 8—4 2	1871	6,320	3 10—6 2
1852	6,271	2 8—4 0	1872	7,560	3 8—6 0
1853	7,037	3 2—4 10	1873	6,170	4 4—6 6
1854	6,181	3 6—5 4	1874	6,570	4 4—6 8
1855	7,000	3 8—4 2	1875	7,660	4 6—6 6
1856	6,748	3 4—5 0	1876	7,020	4 4—6 4
1857	6,856	3 4—4 8	1877	7,510	4 6—6 0
1858	6,424	3 4—5 0	1878	6,830	4 6—6 0
1859	7,560	3 6—5 4	1879	5,620	4 0—6 4
1860	7,860	3 4—5 6	1880	7,660	4 0—6 0
1861	8,840	3 4—5 0	1881	8,150	4 0—6 2
1862	8,430	3 4—5 0	1882	7,370	4 6—6 4
1863	10,372	3 6—5 2	1883	5,940	4 0—6 4
1864	7,130	3 8—5 8	1884	5,300	4 0—6 2
1865	7,530	3 4—5 4	1885	7,550	3 6—5 4
1866	7,340	3 8—5 6	1886	6,010	3 6—5 0
1867	8,110	3 4—5 0	1887	6,420	2 6—5 4
1868	5,320	3 4—5 8	1888	7,600	2 4—5 2

TABLE XV.—AVERAGE ANNUAL NUMBER OF CATTLE, SHEEP, AND PIGS BROUGHT INTO THE LONDON METROPOLITAN CATTLE MARKET, AND INTO THE FOREIGN CATTLE MARKET, IN THE UNDERMENTIONED PERIODS, AND IN THE YEAR 1887.

[From Agricultural Returns of Great Britain.]

Years	NUMBER OF ANIMALS				Total	Per-centage of Foreign Animals
	Home	Foreign				
	Metropolitan Cattle Market	Metropolitan Cattle Market	Foreign Cattle Market	Total		

CATTLE.¹

	Number	Number	Number	Number	Number	Per cent.
1872-75	180,558	107,375	20,486	127,861	308,419	41
1876-80	179,253	68,179	70,399	138,578	317,831	44
1881-85	148,983	34,279	118,878	153,157	302,140	51
1886	186,580	37,930	86,969	124,899	311,479	40
1887	201,600	33,140	80,106	113,246	314,846	36

SHEEP.²

1872-75	870,887	653,173	52,887	706,060	1,576,947	45
1876-80	789,200	210,464	551,487	761,951	1,551,151	49
1881-85	588,298	44,828	684,595	729,423	1,317,721	55
1886	674,090	68,960	707,531	776,491	1,450,581	54
1887	740,460	28,890	729,198	758,088	1,498,538	51

PIGS.

1872-75	6,391	206	9,748	9,954	16,345	61
1876-80	1,618	255	18,203	18,468	20,076	92
1881-85	602	10	16,687	16,697	17,299	97
1886	280	—	17,284	17,284	17,564	98
1887	1,110	—	18,680	18,680	19,790	94

¹ Including Calves, but exclusive of Milch Cows.² Including Lambs.

TABLE XVI.—AVERAGE VALUE PER HEAD OF LIVE CATTLE, SHEEP, AND PIGS IMPORTED INTO THE UNITED KINGDOM FROM FOREIGN COUNTRIES AND BRITISH POSSESSIONS IN THE UNDERMENTIONED YEARS.

[From Returns furnished by the Board of Customs.]

Years	Cattle			Sheep and Lambs	Pigs
	Oxen and Bulls	Cows	Calves		
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1879	21 17 6	16 17 9	4 14 8	2 7 8	3 9 11
1880	22 0 11	18 5 7	4 14 11	2 8 1	3 9 10
1881	21 15 2	19 9 11	4 13 1	2 6 10	3 7 5
1882	21 4 11	19 10 1	4 13 10	2 5 6	3 13 5
1883	21 11 4	19 14 3	4 13 3	2 5 1	3 8 6
1884	21 19 10	19 12 0	4 14 6	2 5 5	3 3 7
1885	21 2 10	19 6 11	4 11 2	2 3 3	3 16 6
1886	18 1 2	13 5 10	3 18 8	1 18 8	2 19 4
1887	17 6 11	12 12 3	3 17 5	1 13 10	2 18 7
1888	17 17 3	12 15 5	3 12 11	1 16 5	3 1 0

TABLE XVII.—NUMBER OF HORSES, AND THEIR DECLARED VALUE, IMPORTED INTO, AND EXPORTED FROM, THE UNITED KINGDOM, IN EACH OF THE UNDERMENTIONED YEARS.

[From Annual Statements of Trade of the United Kingdom.]

Year	IMPORTED		Year	EXPORTED	
	Number	Value		Number	Value
		£			£
1884	12,929	256,789	1884	6,973	406,915
1885	13,023	195,624	1885	6,196	371,406
1886	11,026	189,901	1886	7,326	409,045
1887	11,641	197,679	1887	9,463	547,396
1888	11,505	192,621	1888	12,884	848,883

NOTE.—The countries from which horses were imported in 1887 were as follows:—Germany, 4,680; Denmark, 4,150; Holland, 905; France, 746; Belgium, 345; Norway, 195; United States of America, 141; Canada, 261; Channel Islands, 85; and 133 from other countries. The corresponding figures for 1888 have not yet been published.

TABLE XVIII.—AVERAGE PRICES OF WOOL IN EACH OF THE UNDERMENTIONED YEARS.¹

Years	ENGLISH				AUSTRALASIAN	SOUTH AFRICAN
	Leicester	Half-breds	Kent	Southdown		
	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1883	9 to 9½	9½ to 10¼	9½ to 10	0 10¾ to 1 2	1 0½	1 2¼
1884	8¾ " 9¼	9 " 9½	9 " 9¾	0 10 " 1 1½	1 0½	1 1½
1885	8½ " 9	8¾ " 9½	9 " 9½	0 9 " 1 0½	0 10½	0 9½
1886	9 " 9¾	9½ " 10¾	9¾ " 10½	0 9½ " 1 0½	0 9½	0 9½
1887	9¾ " 10¼	10 " 11¼	10¼ " 10¾	0 10½ " 1 0¾	0 10½	0 10½
1888	9¼ " 10	9½ " 10½	9½ " 10½	0 9¾ " 0 11¼	0 10½	0 10

¹ The prices of English wool have been calculated from the prices given weekly in the *Economist* newspaper. The figures relating to Australasian and South African wool have been taken from Returns furnished by the Board of Customs.

TABLE XIX.—QUANTITIES OF WOOL (SHEEP, LAMB, AND ALPACA) IMPORTED INTO THE UNITED KINGDOM FROM EACH COUNTRY IN EACH YEAR, FROM 1881 to 1887 INCLUSIVE; AND THE TOTAL QUANTITIES OF FOREIGN AND COLONIAL WOOL IMPORTED AND EXPORTED IN EACH YEAR, WITH THE EXCESS OF IMPORTS.

[From Board of Trade Returns.]

("000" omitted.)

COUNTRIES from which exported	1881	1882	1883	1884	1885	1886	1887
Australasia :—	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
New South Wales	87,740	93,636	100,629	120,221	110,106	134,930	115,897
Queensland	15,170	20,914	25,324	29,924	31,400	25,952	27,627
South Australia	47,912	53,027	45,609	45,859	41,349	48,207	41,505
Victoria	108,807	104,389	98,828	99,355	83,201	93,890	96,289
Western Australia	3,671	3,555	3,701	4,476	5,526	5,786	5,811
Tasmania	6,997	6,609	6,758	6,159	5,868	5,452	5,822
New Zealand	59,369	63,654	70,837	75,410	78,606	87,208	91,055
Australasia.—Total	329,666	345,784	351,686	381,404	356,056	401,425	383,506
Argentine Confederation	655	2,693	1,221	538	2,784	6,697	1,018
Belgium	3,613	5,338	5,265	3,854	4,585	3,441	3,628
Cape of Good Hope	42,707	47,538	41,095	41,076	33,986	48,194	47,490
Chili	1,723	1,258	649	1,593	1,531	732	1,693
Denmark	2,499	1,191	2,158	1,471	1,920	1,997	1,369
Egypt	1,987	1,487	2,699	2,087	2,376	3,838	5,175
Falkland Islands ¹	—	—	—	—	—	2,499	2,909
France	3,018	4,948	5,338	5,586	7,621	11,465	10,235
Germany	2,264	2,728	4,339	1,650	1,887	3,288	3,767
Holland	1,520	581	451	810	683	2,756	2,151
India, British	22,215	26,924	24,822	24,799	25,697	34,597	33,462
Morocco	806	2,769	2,633	896	572	1,390	1,995
Natal	6,824	6,338	7,776	10,259	13,028	13,063	17,822
Peru	3,134	6,052	2,427	11,427	6,270	5,789	6,787
Portugal	1,539	1,961	1,970	1,428	1,491	2,495	1,976
Russia { North	2,786	2,889	3,476	2,508	5,161	4,092	6,389
South	13,009	14,649	24,672	20,492	24,488	25,630	21,365
Turkey	6,719	9,400	8,690	10,378	11,113	17,965	20,130
Other Countries	3,458	4,457	4,580	4,231	4,439	5,118	5,058
Total imported	450,142	488,985	495,947	526,527	505,688	596,471	577,925
Total exported ²	265,584	263,966	277,234	276,919	267,502	312,006	319,203
Excess of Imports	184,558	225,019	218,713	249,608	238,186	284,465	258,722

¹ The Falkland Islands were included with "Other Countries" prior to 1886.

² Foreign and Colonial only.

TABLE XX.—QUANTITIES OF CERTAIN ARTICLES OF FOREIGN AND COLONIAL PRODUCTION IMPORTED IN THE YEARS 1885-88.

[From Trade and Navigation Returns.]

	1885	1886	1887	1888
Bones (burnt or not, or as animal charcoal) . tons	64,140	57,175	51,882	65,651
Cotton, Raw . . . cwts.	12,586,009	15,187,299	15,903,117	15,246,408
Flax "	1,664,836	1,287,034	1,560,696	1,833,650
Guano tons	24,757	68,744	21,251	25,052
Hemp cwts.	1,446,398	1,213,857	1,472,857	1,822,065
Hops "	266,473	153,788	145,298	215,927
Hides untanned: Dry . "	672,878	721,964	627,132	585,254
" " Wet . "	555,114	499,271	523,393	576,176
Petroleum gallons	73,869,787	71,026,962	77,458,062	94,177,807
Oilseed Cakes . . . tons	283,052	296,530	265,694	259,573
Potatoes cwts.	2,300,824	2,709,444	2,762,958	2,384,144
Lard "	869,842	896,324	906,190	883,469
Clover and Grass Seeds . "	315,803	289,214	335,858	334,432
Flax-seed and Linseed qrs.	2,056,263	2,081,283	2,341,175	2,542,027
Rape "	544,275	372,613	413,856	279,615
Sheep and Lambs' Wool lbs.	501,182,161	591,872,167	574,196,058	635,936,244

TABLE XXI.—QUANTITIES OF UNMANUFACTURED TOBACCO IMPORTED INTO THE UNITED KINGDOM FROM EACH COUNTRY IN EACH OF THE YEARS 1883-87.

[From Annual Statements of Trade of United Kingdom.]

	1883	1884	1885	1886	1887
	lbs.	lbs.	lbs.	lbs.	lbs.
Germany	1,378,579	1,464,350	1,384,106	924,560	1,061,581
Holland	6,655,548	5,728,744	6,478,410	5,077,642	5,496,984
Turkey	1,539,654	1,114,143	1,902,542	2,732,438	841,737
China and Hong Kong	854,547	1,813,221	1,507,213	1,539,913	620,948
Japan	902,981	1,876,787	5,400,127	1,391,810	887,844
Columbia, United States of . . }	230,590	122,570	160,029	100,807	191,168
United States . .	42,370,653	37,186,980	60,247,715	70,458,667	62,130,504
Other Countries . .	2,542,647	4,223,612	2,043,197	992,145	948,228
Total	56,475,199	53,530,407	79,123,339	83,217,982	72,178,994

NOTE.—The total quantity of Unmanufactured Tobacco imported from all countries in 1888 was 46,052,073 lbs. The details of this amount cannot yet be given.

TABLE XXII.—QUANTITIES AND VALUES OF BUTTER, MARGARINE,
YEAR FROM 1884 TO

[From Trade and

QUANTITIES					
	1884	1885	1886	1887	1888
BUTTER	cwts.	cwts.	cwts.	cwts.	cwts.
From Denmark . . .	335,067	377,447	400,556	487,603	604,512
„ Germany . . .	146,400	143,482	119,154	156,430	160,915
„ Holland . . .	1,112,212	307,861	359,013	164,474	155,020
„ France . . .	509,716	450,933	402,620	416,067	439,993
„ Canada . . .	54,214	36,259	31,348	32,623	9,173
„ United States .	100,151	77,588	42,336	52,329	23,207
„ Other Countries .	214,807	159,732	188,377	205,379	276,494
Total . . .	2,472,567	1,553,302	1,543,404	1,514,905	1,669,314
MARGARINE ¹	cwts.	cwts.	cwts.	cwts.	cwts.
From Norway . . .	—	17,411	20,875	16,650	7,784
„ Holland . . .	—	772,473	833,957	1,172,074	1,043,401
„ Belgium . . .	—	40,456	20,002	22,895	6,676
„ Other Countries .	—	16,923	11,739	61,476	80,313
Total . . .	—	847,263	886,573	1,273,095	1,138,174
CHEESE	cwts.	cwts.	cwts.	cwts.	cwts.
From Holland . . .	318,996	335,973	318,596	362,014	328,801
„ France . . .	27,093	29,817	32,103	30,260	29,304
„ Canada . . .	589,460	606,002	507,875	631,837	667,461
„ United States .	975,362	844,361	854,770	759,463	812,430
„ Other Countries .	15,159	16,897	19,843	50,893	79,545
Total . . .	1,926,070	1,833,050	1,733,187	1,834,467	1,917,541
EGGS	great hundreds	great hundreds	great hundreds	great hundreds	great hundreds
From Germany . . .	2,266,287	2,279,646	2,581,215	3,209,799	3,707,091
„ Belgium . . .	2,093,091	2,082,724	1,955,741	1,678,420	1,582,929
„ France . . .	3,265,174	3,338,823	3,208,115	3,070,525	2,692,057
„ Other Countries .	651,001	650,113	868,091	1,111,093	1,338,540
Total . . .	8,275,553	8,351,306	8,613,162	9,069,837	9,320,617

¹ Margarine was included

CHEESE, AND EGGS IMPORTED INTO THE UNITED KINGDOM IN EACH
1888 INCLUSIVE.

Navigation Returns.]

VALUES					
	1884	1885	1886	1887	1888
BUTTER					
	£	£	£	£	£
From Denmark . . .	2,008,451	2,117,831	2,194,905	2,669,125	3,335,064
„ Germany . . .	864,084	788,899	611,548	793,579	813,198
„ Holland . . .	4,982,165	1,661,380	1,775,454	851,467	784,523
„ France . . .	2,895,184	2,578,618	2,264,001	2,264,669	2,378,835
„ Canada . . .	249,754	146,166	119,970	139,566	40,797
„ United States . .	447,811	314,062	160,391	213,712	93,243
„ Other Countries .	1,078,844	899,248	1,013,919	1,084,651	1,456,533
Total . . .	12,526,293	8,506,204	8,140,188	8,016,769	8,902,193
MARGARINE¹					
	£	£	£	£	£
From Norway . . .	—	69,995	82,582	61,962	25,045
„ Holland . . .	—	2,793,516	2,767,599	3,546,591	2,951,522
„ Belgium . . .	—	144,404	69,240	70,301	18,130
„ Other Countries .	—	46,764	38,879	191,094	269,129
Total . . .	—	3,054,679	2,958,300	3,869,948	3,263,826
CHEESE					
	£	£	£	£	£
From Holland . . .	891,852	833,490	764,522	883,934	822,498
„ France . . .	90,169	96,221	103,185	99,667	92,428
„ Canada . . .	1,496,599	1,229,570	1,116,178	1,552,764	1,523,833
„ United States . .	2,477,981	1,863,958	1,834,370	1,847,412	1,905,776
„ Other Countries .	41,293	41,959	49,641	125,160	197,743
Total . . .	4,997,894	4,065,198	3,867,896	4,508,937	4,542,278
EGGS					
	£	£	£	£	£
From Germany . . .	682,906	671,867	743,618	943,914	1,146,739
„ Belgium . . .	710,479	706,225	653,784	552,598	490,011
„ France . . .	1,303,520	1,341,717	1,215,360	1,251,688	1,053,309
„ Other Countries .	212,022	209,276	266,238	332,361	387,050
Total . . .	2,908,927	2,929,085	2,879,000	3,080,561	3,077,109

with Butter prior to 1885

TABLE XXIII.—PRINCIPAL CORN CROPS OF THE WORLD.

COMPARATIVE STATEMENTS (*partly estimated*) showing the Acreage (English Statute Measure) of Land under Wheat, Barley, Oats, and Maize respectively; the produce thereof, and the yield per acre, in the undermentioned countries in the years 1885, 1886, 1887.

[*From Statistical Abstracts of United Kingdom.*]

(A) WHEAT.

NAME OF COUNTRY	1885				1886				1887			
	Acreage, "000" omitted	Acres	Produce, "000" omitted	Yield per acre	Acreage, "000" omitted	Acres	Produce, "000" omitted	Yield per acre	Acreage, "000" omitted	Acres	Produce, "000" omitted	Yield per acre
United Kingdom			Bush.	Bush.			Bush.	Bush.			Bush.	Bush.
Australasia ¹	2,549		79,636	31·2	2,355		63,348	26·9	2,384		76,225	32·0
Austria	1,532		17,096	11·2	1,718		23,209	14·7	2,060		28,576	13·9
Austria-Hungary	2,949		46,793	15·9	2,900		43,267	14·9				
Belgium	6,769		110,296	16·3	6,827		99,675	14·6				
Canada ²	—		16,641	—	—		16,572	—			141,407	20·6
Denmark	2,042		37,597	18·4	1,848		33,310	18·0			32,425	17·9
France	—		5,326	—	—		5,007	—			5,799	—
Germany	17,183		290,120	17·6	17,182		295,039	17·2			—	—
Holland	4,727		95,480	20·2	4,734		97,917	20·7			103,985	21·9
India	209		6,138	29·3	—		—	—			—	—
Italy	27,393		288,938	10·5	26,735		238,586	8·9			266,882	9·9
Russia in Europe	—		106,861	—	—		109,449	—			—	—
Sweden	—		172,378	—	—		156,546	—			269,085	—
United States of America ³	41,073		3,797	—	41,079		3,685	—			4,192	—
	34,189		346,201	10·1	36,806		443,249	12·0			442,387	11·7

¹ Exclusive of South Australia, figures for that colony not being available.

² Including spelt.

³ The produce for the United States, which was originally given in Winchester Bushels, has been converted into the equivalent quantities in Imperial Bushels.

⁴ Including rye.

⁵ Ontario and Manitoba only.

(B) BARLEY.

NAME OF COUNTRY	1885				1886				1887			
	Acreage, "000" omitted	Produce, "000" omitted	Yield per acre	Acreage, "000" omitted	Produce, "000" omitted	Yield per acre	Acreage, "000" omitted	Produce, "000" omitted	Acreage, "000" omitted	Produce, "000" omitted	Yield per acre	Yield per acre
United Kingdom	Acres 2,437	Bush. 85,122	Bush. 35.2	Acres 2,423	Bush. 78,310	Bush. 32.3	Acres 2,248	Bush. 69,948	Bush. 31.1	—	—	—
Australasia ¹	127	2,561	20.1	73	1,682	22.9	84	1,955	23.2	—	—	—
Austria-Hungary { Austria	2,881	50,448	17.5	2,761	51,611	18.7	—	—	—	—	—	—
Hungary	2,583	52,638	20.4	2,579	36,696	14.2	2,480	53,998	21.8	—	—	—
Belgium	—	5,547	—	—	3,567	—	—	—	—	—	—	—
Canada ²	650	17,867	27.5	805	20,476	25.4	823	19,060	23.2	—	—	—
Denmark	—	22,346	—	—	23,293	—	—	22,113	—	—	—	—
France	2,360	47,892	20.3	2,338	49,206	21.0	—	—	—	—	—	—
Germany	4,297	99,649	23.2	4,277	103,024	24.1	4,276	97,219	22.7	—	—	—
Holland	123	5,306	43.3	—	—	—	—	—	—	—	—	—
India	—	—	—	—	—	—	—	—	—	—	—	—
Italy	—	8,420	—	8,674	—	—	—	—	—	—	—	—
Russia in Europe	—	97,170	—	—	129,740	—	—	162,498	—	—	—	—
Sweden	2,604 ³	13,152	—	2,647 ³	15,569	—	—	14,699	—	—	—	—
United States of America ⁴	2,729	56,577	20.7	2,653	57,612	21.7	—	—	—	—	—	—

¹ Exclusive of South Australia, figures for that colony not being available.² Ontario and Manitoba only.³ Including oats and mixed corn.⁴ The produce for the United States, which was originally given in Winchester Bushels, has been converted into the equivalent quantities in Imperial Bushels.

TABLE XXIII. (continued).—(C) OATS.

NAME OF COUNTRY	1885				1886				1887			
	Acreage, "000" ¹ omitted	Produce, "000" ² omitted	Yield per acre		Acreage, "000" ³ omitted	Produce, "000" ² omitted	Yield per acre		Acreage, "000" ³ omitted	Produce, "000" ² omitted	Yield per acre	
United Kingdom	Acres	Bush.	Bush.		Acres	Bush.	Bush.		Acres	Bush.	Bush.	
Australasia ¹	4,269	160,441	37.6		4,404	169,376	38.5		4,403	150,789	34.2	
{ Austria	591	14,384	24.3		620	17,421	28.1		578	15,893	27.5	
Austria-Hungary	4,518	91,822	20.3		4,614	109,258	23.7		—	—	—	
{ Hungary	2,564	52,764	20.6		2,602	53,293	20.5		2,583	59,599	23.1	
Belgium.	—	24,952	—		—	28,390	—		—	—	—	
Canada ²	1,701	60,764	35.7		1,783	62,138	34.8		1,838	57,113	31.1	
Denmark	—	31,777	—		—	32,762	—		—	29,444	—	
France	9,113	235,208	25.8		9,228	245,544	26.6		—	—	—	
Germany	9,329	245,399	26.3		9,402	274,420	29.2		9,411	243,085	25.8	
Holland.	283	12,636	44.7		—	—	—		—	—	—	
Italy	—	15,255	—		—	14,352	—		—	—	—	
Russia in Europe	—	376,486	—		—	551,500	—		—	599,420	—	
Sweden	—	50,298	—		—	53,352	—		—	54,785	—	
United States of America ³	22,784	610,179	26.8		23,658	605,065	25.6		25,921	639,465	24.7	

(D) MAIZE.

Australasia ¹	209 ⁴	5,993 ⁴	28.6 ⁴	25.3 ⁴	228 ⁴	5,770 ⁴	25.1 ⁴	6,905 ⁴	27.5 ¹
{ Austria	908	19,272	21.2	20.8	896	18,608	—	—	—
Austria-Hungary	4,632	105,729	22.8	17.3	4,728	81,861	4,515	71,441	15.8
{ Hungary	168	10,741 ⁵	—	—	157	10,803 ⁵	164	8,405 ⁵	—
Canada ²	—	26,828 ⁶	17.8 ⁶	17.8 ⁶	1,481 ⁶	26,324 ⁶	—	—	—
France	1,507 ⁶	77,429	—	—	—	77,791	—	—	—
Italy	—	16,705	—	—	—	20,455	—	—	—
Russia in Europe	—	—	—	—	—	—	—	—	—
United States of America ³	73,130	1,877,020	25.7	21.3	75,694	1,614,557	72,393	12,579	19.5
								1,411,671	

¹ Exclusive of South Australia, figures for that colony not being available.² Ontario and Manitoba only.³ The produce for the United States, which was originally given in Winchester Bushels, has been converted into the equivalent quantities in Imperial Bushels.⁴ Colonies of New South Wales, Victoria, Western Australia, and Queensland only.⁵ In ear.⁶ Including millet.

TABLE XXIV.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS IN THE UNDERMENTIONED COUNTRIES, FOR EACH OF THE YEARS INDICATED.

[From Board of Trade Returns.]

Countries	Years	Horses	Horned Cattle	Sheep and Lambs	Pigs
		No.	No.	No.	No.
United Kingdom	{ 1886	1,927,527	10,872,811	28,955,240	3,497,165
	{ 1887	1,936,925	10,639,960	29,401,750	3,720,957
	{ 1888	1,936,702	10,268,600	28,938,716	3,815,643
Australasia	{ 1885	1,328,396	8,228,844	82,175,714	1,039,338
	{ 1886	1,373,346	8,228,628	86,245,720	1,053,453
	{ 1887	1,437,819	8,867,374	97,229,802	1,097,674
Canada ¹	{ 1885	584,872	2,068,853	1,765,942	888,333
	{ 1886	617,376	2,192,099	1,643,534	941,446
	{ 1887	605,276	2,049,945	1,408,701	868,530
Cape Colony	{ 1875	241,342	1,329,445	11,279,743	132,373
	{ 1888	262,521	1,266,552	13,073,192	140,895
Natal.	{ 1885	48,729	600,984	535,482	23,419
	{ 1886	50,012	629,725	676,437	32,927
	{ 1887	54,326	611,794	484,288	46,306
Austria	{ 1869	1,334,623	7,421,915	5,026,392	2,551,973
	{ 1880	1,463,282	8,584,077	3,841,340	2,721,541
Austria-Hungary	{ 1870	2,158,819	5,279,193	15,076,097	4,443,279
	{ 1880	2,078,528	5,311,378	9,838,133	4,160,127
	{ 1884	1,748,859	4,879,038	10,594,831	4,803,639
Belgium.	{ 1866	283,163	1,242,445	586,097	632,301
	{ 1880	271,974	1,382,815	365,400	646,375
Denmark	{ 1871	316,570	1,238,898	1,842,481	442,421
	{ 1876	352,262	1,346,321	1,719,249	503,667
	{ 1881	347,561	1,470,078	1,548,613	527,417
France	{ 1883	2,852,187	11,793,812	21,639,657	5,847,405
	{ 1885	2,911,392	13,104,970	22,616,547	5,881,088
	{ 1886	2,938,489	13,275,021	22,688,230	5,774,924
Germany	{ 1873	3,352,231	15,776,702	24,999,406	7,124,088
	{ 1883	3,522,545	15,786,764	19,189,715	9,206,195
Holland.	{ 1882	270,456	1,427,900	745,187	403,618
	{ 1883	269,182	1,437,100	703,521	420,648
	{ 1884	269,074	1,474,412	752,949	426,914
Italy	{ 1875	657,544	3,489,125	6,977,104	1,553,582
	{ 1881	660,123	4,783,232	8,596,108	1,163,916
Norway	{ 1865	149,167	953,036	1,705,394	96,166
	{ 1875	151,903	1,016,617	1,686,306	101,020
Russia in Europe	{ 1877	17,589,118	27,323,219	51,822,238	10,839,093
	{ 1882	20,015,659	23,845,104	47,508,966	9,207,666
	{ 1883	17,880,792	23,628,031	46,724,736	9,361,980
Sweden	{ 1884	476,008	2,327,003	1,410,177	476,889
	{ 1885	480,330	2,366,286	1,442,396	515,556
	{ 1886	484,885	2,381,467	1,443,676	548,210
United States of America	{ 1885	12,077,657	45,510,630	48,322,331	46,092,043
	{ 1886	12,496,744	48,033,833	44,759,314	44,612,836
	{ 1887	13,172,936	49,234,777	43,544,755	44,346,525

¹ The figures given for Canada in 1885 and 1887 only relate to the Provinces of Ontario and Manitoba. The returns published for 1886 include 24,125 Horses, 86,536 Cattle, 19,398 Sheep, and 22,542 Pigs in The N.-W. Territories.

TABLE XXV.—PRICES OF BUTTER AND CHEESE IN LONDON DURING THE FIRST WEEK OF JANUARY OF EACH OF THE TEN YEARS 1880-89.

[From "The Grocer."]

BUTTER.

	1889		1888		1887		1886		1885	
	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
BUTTER (per cwt.) :—										
Cork 1sts . . .	130	to —	—	—	—	—	—	—	—	—
2nds . . .	122	„ —	112	to 116	124	to —	117	to —	119	to 136
3rds . . .	109	„ —	91	„ —	102	„ —	75	„ —	89	„ 91
4ths . . .	90	„ —	76	„ —	84	„ —	50	„ —	58	„ —
Normandy . . .	90	„ 102	100	„ 112	90	„ 134	80	„ 144	100	„ 142
Dutch, or Friesland . . .	86	„ 118	100	„ 122	80	„ 116	—	„ —	—	„ —
American . . .	70	„ 96	50	„ 116	76	„ 116	60	„ 112	80	„ 124
Margarine, &c. . .	50	„ 90	36	„ 80	44	„ 90	40	„ 90	45	„ 90
	1884		1883		1882		1881		1880	
Cork 1sts . . .	134	to 143	—	—	136	to 140	141	to 143	145	to —
2nds . . .	130	„ 136	—	—	129	„ 131	138	„ 141	143	„ —
3rds . . .	94	„ —	115	to —	111	„ 113	104	„ 107	110	„ —
4ths . . .	70	„ —	89	„ —	82	„ —	77	„ 78	97	„ —
Normandy . . .	97	„ 144	110	„ 150	110	„ 150	108	„ 150	110	„ 130
Dutch . . .	124	„ 136	134	„ 144	125	„ 144	120	„ 130	124	„ 130
American . . .	75	„ 122	—	—	60	„ 122	95	„ 130	90	„ 130
Margarine, &c. . .	40	„ 80	60	„ 90	50	„ 85	65	„ 84	65	„ 90

CHEESE.

	1889		1888		1887		1886		1885	
	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
CHEESE (per cwt.) :—										
English . . .	36	to 86	46	to 78	38	to 78	54	to 78	64	to 85
American . . .	34	„ 60	40	„ 62	36	„ 64	54	„ 54	45	„ 68
Gouda . . .	40	„ 54	46	„ 52	40	„ 46	50	„ 54	40	„ 52
Edam . . .	42	„ 54	56	„ 60	50	„ 54	46	„ 52	54	„ 62
	1884		1883		1882		1881		1880	
English . . .	64	to 86	62	to 82	60	to 82	70	to 90	66	to 86
American . . .	40	„ 68	46	„ 70	42	„ 68	56	„ 72	56	„ 70
Gouda . . .	54	„ 64	54	„ 62	56	„ 62	60	„ 68	56	„ 62
Edam . . .	61	„ 66	56	„ 64	57	„ 64	62	„ 68	60	„ 64

DAIRY PRODUCE, 1888.

The following remarks have appeared in the *Grocer* :—

BUTTER.—The unusual plentifulness of butter during 1888 has been due to the luxuriant growth of grass which has been seen in all parts of the kingdom, as well as on the Continent. In the early autumn the pastures were as green as they were in the spring, and the make of English Butter has, in consequence, been so encouraged and extended month after month, that in several of the home counties the bulk of consumers' wants have been supplied from local dairies and farms, instead of being satisfied by the shipments from places abroad.

The trade has by this means been less dependent on foreign supplies, which have arrived much more freely from Denmark than anywhere else, and prices have, as a rule, tended strongly in a downward direction. It was chiefly in the first quarter of the year, when there was a scarcity of finest dairies, and the French and Danish descriptions were quoted between 120s. and 140s., that the value ranged at all high, as it soon afterwards began to fall, till in the summer months Normandy was sold at 86s. to 100s., Danish at 82s. to 94s., and Dutch (or Friesland) at 70s. to 78s.; and although a considerable rise subsequently took place, the current rates since then, excepting for Danish, have ruled, on the average, 10s. to 20s. per cwt. below those in 1887.

IRISH BUTTER was also remarkably cheap during the greater part of the year; in May the lowest prices were—for first "Corks," 74s., seconds 65s., thirds 57s., and fourths 48s. f.o.b. On these figures, however, there has since been a gradual advance of between 40s. and 50s. per cwt.

FACTORY BUTTERS, both Irish and Foreign, have also come in for a fair share of attention, and where quality and condition, and not price, have been the great desiderata, they have given entire satisfaction.

MARGARINE.—In spite of the new Act which was directed against the article, Margarine has maintained its hold upon the public, having been dealt in almost as largely as in 1887, and certainly more extensively than in 1886, if the general importations into this country are to be taken as any criterion; and comparatively full prices have been obtained, especially for the finer sorts of "mixtures," which could be bought with confidence for their uniform excellence when it was not certain whether "pure" butter would retain its sweetness and consistency in all temperatures alike.

CHEESE.—Lower prices have been the rule rather than the exception during the past year, as the supplies of cheese have been more abundant than previously, and the consumption of the article, through ungenial weather in the summer months, has lost ground without being able to fully recover it again. English cheese has played a more than usually active part in the trade of 1888, having often been freely offered at cheap rates when other kinds were held firmly for some advance, and the quality being reliable and equally suited to an ordinary or a high-class family demand, larger quantities than most commonly believed have been cleared off at quotations many shillings below those in preceding years.

Early in the year, operations in American were much cramped by the prevailing high rates, but the value has since descended to a very reasonable point. At the close of September, the top prices for the best goods (including fancy Canadian) were from 43s. to 48s., and for "over-kept" parcels 36s. to 42s., in contrast with 58s. to 62s. for the finest qualities in January 1888. During the last three months of 1888, however, more firmness has been apparent, and the choicest grades have been taken at a gradual reduction of 10s. per cwt.—say at 58s. to 60s. per cwt. Dutch cheese has likewise been much cheaper than before, as, coming into keener competition with other sorts, importers have been unable always to insist upon the enhanced rates formerly current being paid, and the bulk of the transactions reported month after month have been on terms below 50s. per cwt. for both Edams and Goudas, with Friesland Cheese as low down as 20s. to 34s. New Zealand cheese has formed an entirely new feature in the market, and has commanded relatively good prices, viz. from 46s. to 56s. for good and fine makes, with the promise of a growing trade in the future.

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

I.—*The History of a Field newly laid down to Permanent Grass.*
By SIR J. B. LAWES, Bart., LL.D., F.R.S.

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Introduction.

THE history of a field laid down to permanent grass nearly thirty years ago, which has been mown for hay every year from the commencement, and of which the particulars, both of the manures applied and of the produce removed, have been recorded for the last twenty-three years, cannot fail to be of interest; especially at the present time, when the subject of permanent grass is receiving so much attention.

The land in question forms part of the Rothamsted Estate, and it had previously been under arable culture. In 1856 about two acres were fenced off, and let to Dr. Gilbert, who wished to have some grass-land near his house. The soil is very similar to much of that of Rothamsted and the neighbourhood; the surface being a heavy loam, with a few feet of reddish-yellow clay subsoil mixed with flint stones, and chalk below. In some parts of the parish the subsoil flints are so abundant that they are sifted out and sold in large quantities for road-making, &c. It is probable that Dr. Gilbert's field has a more gravelly subsoil than the portions of the farm at a higher level, and that it is, therefore, somewhat less suitable for permanent pasture. He decided to sell hay every year; and, as he kept no stock, he depended entirely upon purchased manures.

In 1856 barley, and grass seeds costing 32s. per acre, were sown. The standing crop of barley was sold by auction for 5*l.* 10s. per acre; but the grass seeds failed. Barley, and grass seeds to the same value, were again sown in 1857. The barley was sold by auction for 5*l.* 17s. 6*d.* per acre; but the grass seeds again failed. Red clover was sown in 1858. It yielded a small crop that year, which was made into hay and sold for 4*l.* 5s., equal to 2*l.* 2s. 6*d.* per acre; and in 1859 the growing crop of clover was sold for 5*l.* per acre.

After the removal of the clover, grass seeds were again sown, and this time succeeded. In 1860 and 1861 artificial manures only were applied. It was found that under this treatment leguminous herbage was very scanty; and in 1862 some alsike and Dutch clover were sown, and a heavy dressing of dung, at the rate of 11 tons 17 cwts. per acre, was applied, with a little superphosphate and nitrate of soda in addition. In 1863 dung was again applied, at the rate of 4 tons 13 cwts. per acre; but in 1864 and 1865 artificial manures only, consisting of superphosphate, nitrate of soda, and a little sulphate of potash, were used.

The Economical Results.

From this time more attention was paid to the field. The object was to endeavour to maintain the character of the herbage, and at the same time to obtain as large crops of hay as was consistent with the maintenance of this condition. It was sought to maintain the quality by means of dung, and to secure full quantity by the use of artificial manures in addition, which consisted of superphosphate, and sulphate of potash, with guano, or nitrate of soda, or both, as nitrogenous manure. After the first few years the general plan adopted was to apply two or sometimes three trucks of London dung every other year, but occasionally it was applied only every third year; artificial manures were, however, with one or two exceptions, applied every year.

The following Table (I.) shows the amounts of dung and of the different artificial manures applied, also the amounts of hay removed, per acre, in each of the 23 years 1866–1888 inclusive; and the summary at the bottom gives the average amounts per acre per annum, both of manure applied and of hay sold, over the first 8 years 1866–1873, the second 8 years 1874–1881, and the third period of 7 years 1882–1888; also the average over the whole period of 23 years.

Referring here to the average results only, the figures in the bottom division of the Table show, that the amount of dung applied averaged 2 tons 10 cwts. per acre per annum over the

TABLE I.—MANURES APPLIED AND HAY REMOVED PER ACRE PER ANNUM.

Year	Manures applied					Produce of hay
	Dung	Super-phosphate	Sulphate of potash	Guano	Nitrate of soda	
	tons cwts.	lbs.	lbs.	lbs.	lbs.	tons cwts.
1866	—	64	64	64	64	1 10 ⁷ / ₈
1867	—	64	64	64	64	1 6 ⁷ / ₈
1868	6 12	—	—	128	128	1 1 ¹ / ₂
1869	—	—	—	201	—	1 10 ⁷ / ₈
1870	6 4	—	—	—	134	0 11 ¹ / ₂
1871	—	—	—	67	67	1 13 ⁷ / ₈
1872	—	67	—	—	134	1 18 ³ / ₈
1873	7 4	—	—	—	—	1 4
1874	—	201	67	—	134	1 13 ⁷ / ₈
1875	6 18	134	—	—	134	1 11
1876	—	101	101	—	168	1 14 ⁷ / ₈
1877	8 11	67	67	—	134	2 1 ¹ / ₂
1878	—	101	84 ¹	—	168	1 10 ⁷ / ₈
1879	7 1	67	67	—	101	2 9 ⁷ / ₈
1880	—	67	67	67	67	1 8 ⁷ / ₈
1881	7 14	67	67	—	134	1 0 ⁷ / ₈
1882	—	67	67	—	134	2 11 ¹ / ₂
1883	8 8	67	67	—	67	2 21 ¹ / ₄
1884	—	67	67	—	67	2 0 ¹ / ₄
1885	9 6	67	67	—	67	2 12 ¹ / ₂
1886	—	67	67	—	67	2 5 ³ / ₈
1887	10 8	—	—	—	—	1 13 ⁷ / ₈
1888	—	67	67	—	67	1 16 ¹ / ₄

Summary—Averages.

8 years 1866–1873	2 10	24	16	66	74	1 8
8 years 1874–1881	3 16	101	65	8	130	1 13 ⁷ / ₈
7 years 1882–1888	4 0	57	57	0	67	2 3 ¹ / ₈
23 years 1866–1888	3 8	61	46	26	91	1 14 ³ / ₈

first 8 years, 3 tons 16 cwts. over the second 8, 4 tons over the last 7 years, and 3 tons 8 cwts. over the 23 years. That is to say, there was a gradual increase in the amount of dung applied. Of artificial manures there was an increase, both of the mineral and of the nitrogenous, over the second period compared with the first; but there was again a reduction over the third period. It was found that, under the condition provided by the dung, aided by the artificial mineral manures, the application of as much as 1 cwt. of nitrate of soda per acre per annum was liable to give a too stemmy, and almost exclusively grassy herbage.

¹ 336 lbs. of kainit were applied, reckoned to contain about 84 lbs. sulphate of potash; and it would also supply sulphate of magnesia, and chlorides of magnesium and sodium.

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Hence the quantity was reduced, until it is now found that, with the amount of dung and of artificial mineral manures used, about two-thirds of a cwt. of nitrate of soda per acre per annum is sufficient to yield as full a crop as can be obtained without reducing the bottom herbage, and therefore the quality of the hay.

It is seen that, under the above conditions as to manuring, the amount of crop has increased from an average of 1 ton 8 cwts. per acre per annum over the first 8 years, to nearly 1 ton 14 cwts. over the second 8 years, and to nearly 2 tons 4 cwts. over the third period of 7 years; the average over the 23 years being 1 ton 14½ cwts. of hay per acre per annum.

It is obvious, therefore, that the condition of the land has gradually improved. It may be added that, in 1888, in consequence of the luxuriant second growth, a second crop was, for the first time, taken. It amounted to 1 ton 4¼ cwts. per acre, and the first and second crops together amounted to 3 tons 1 cwt. Purchased dung, at the rate of 9 tons per acre, has, however, since been applied. The amount of the second crop is not included in the record of produce given in Table I., which relates to first crops only.

TABLE II.—BALANCE SHEET.

Average per acre per annum, 23 years, 1866–1888.

	£	s.	d.
3 tons 8 cwts. purchased dung, including carriage, cartage, and spreading, at 7s. 6d. per ton	1	5	6
61 lbs. superphosphate, at 5s. per cwt.	0	2	9
46 lbs. sulphate of potash, at 15s. per cwt.	0	6	2
26 lbs. guano, at 11s. per cwt.	0	2	6
91 lbs. nitrate of soda, at 16s. per cwt.	0	13	0
Total for manures	2	9	11
Rent (as arable), tithe, and rates	1	10	0
Harrowing, rolling, and occasional labour	0	10	0
Total	4	9	11
1 ton 14½ cwts. of hay sold, at 4l. per ton	6	18	6
Balance	2	8	7

In attempting to make out a balance-sheet of the results, it is impossible to be strictly accurate, owing to the number of years over which the operations have extended, and the great fluctuations which have taken place in the prices both of the manures used and of the produce obtained during the period. As to the expenses of hay-making, they may be considered as set against the rent obtained for feeding the after-grass, as this fully or more than paid the cost. Adopting an average price of 4l. per ton for the hay, of 7s. 6d. per ton for the dung spread on the

land, which is as nearly as possible the average of the actual cost, and taking the artificial manures at about the average price actually paid, which, however, is higher than they can be purchased for at the present time, Table II. (page 4) gives the estimated outlay and money return per acre per annum over the whole period.

It is obvious, from the results given in Tables I. and II., that a good permanent grass field has been formed from this arable soil, not only without loss, but with some profit. Much of the success is doubtless due to the purchased town dung, and to the comparatively little cost of cartage, owing to the proximity to the railway station, which is only about half a mile distant.

Constituents supplied in the Manures, and removed in the Crops.

It will be desirable, in the next place, to endeavour to arrive at an estimate of the amounts of some of the more important constituents supplied in the manures, and removed in the crops.

With regard to the composition of the dung applied, we have to found an estimate from a consideration of the composition of ordinary farmyard manure, and of the difference in the conditions of the production of such manure and of that obtained from town stables.

In our estimates of the average composition of farmyard manure, we have taken into consideration the results of actual analyses made by Boussingault and by the late Dr. Voelcker; and we have also calculated the composition of such manure on the basis of the quantity of straw and of foods which, in an ordinary four-course rotation, with some import of cake, will go to make up a yard of dung. The estimate so arrived at is, moreover, controlled by actual analyses of good box dung, made in experiments at Woburn many years ago.

Of purchased town dung, however, so far as we are aware, no analyses have been made. It might be argued that, as straw is expensive, town manure would be richer in excrementitious matters than farmyard manure. On the other hand, the smaller quantity of straw used would allow more of the liquid manure to pass into the drains. It may also be observed that maize, which is so largely used as horse food in towns, contains less nitrogen, and less phosphoric acid and potash, than the average of the cake and corn used as food on the farm. Further, whilst the greater part of the farmyard manure is produced by animals which live in the sheds, or boxes, or yards, and deposit the whole of their excrements there, the horses in towns are out of

the stable for some hours daily. Upon the whole, therefore there does not seem to be conclusive ground for supposing that town dung is very much richer than ordinary farmyard manure.

So far as the nitrogen is concerned, however, the estimates given below are based on the same percentage as we assume for farmyard manure, namely 0·64; and also on the alternative assumption of 0·80 per cent. In reference to this point it may be added that the average of determinations made at Rothamsted, in eight samples of box-dung made at Woburn, was 0·736 per cent.

Table III. (opposite) gives approximate estimates of the amounts of nitrogen, phosphoric acid, and potash, in the manures applied, and in the crops removed, assuming average percentages of those constituents in the manures and crops as follows:—Percentage of nitrogen: in the dung 0·64 or 0·80, in the guano 12·0, in the nitrate of soda 15·5, and in the hay 1·5. Percentage of phosphoric acid: in the dung 0·23, in the superphosphate 16·0, in the guano 12·0, and in the hay 0·4. Percentage of potash: in the dung 0·53, in the sulphate of potash 50·0, in the guano 2·5, and in the hay 1·6.

First as to the *nitrogen*:—It is seen that, even adopting the lower percentage of nitrogen in the dung, the calculations show more nitrogen supplied in the manures than removed in crops over the first, the second, and the total periods, but rather less over the third period. The details show that the amount of nitrogen supplied in the dung was higher in each succeeding period; but that supplied in artificial manures was only about half as much over the third as over either of the preceding periods; whilst the amount removed in the crops gradually increased from 47 lbs. per acre per annum over the first period, to 57 lbs. over the second, and 72·4 lbs. over the third period. Nevertheless, as already said, there is, over the total period of 23 years, an excess of nitrogen supplied in manure, which, as the Table shows, amounted to an average of 7·9 lbs. per acre per annum.

Adopting the higher percentage of nitrogen in the dung, however, there is an excess supplied in manure, compared with that taken off in crops, over each of the three periods; and the excess amounted to an average of about 20 lbs. (20·1), per acre per annum, over the 23 years.

Next as to the *phosphoric acid*:—The estimates show an excess supplied in the manure over that taken off in crops, over each of the three periods, and an average excess of 14·9 lbs. per acre per annum over the 23 years. In fact, over each individual period, and the total period, the dung alone is esti-

TABLE III.—NITROGEN, PHOSPHORIC ACID, AND POTASH, SUPPLIED IN THE MANURES, AND REMOVED IN THE HAY-CROPS.

Quantities per Acre per Annum.

	Per acre per annum			
	Nitrogen		Phosphoric acid	Potash
	At 0·64 per cent. in dung	At 0·80 per cent. in dung		
8 years, 1866-1873.				
In dung	lbs. 35·8	lbs. 44·8	lbs. 12·9	lbs. 29·7
In superphosphate.	—	—	3·8	—
In sulphate of potash	—	—	—	8·0
In guano	7·9	7·9	7·9	1·6
In nitrate of soda	11·5	11·5	—	—
Total	55·2	64·2	24·6	39·3
In hay removed	47·1	47·1	12·5	50·2
More (+), or less (—), in manure than in crops	+8·1	+17·1	+12·1	—10·9
8 years, 1874-1881.				
In dung	54·1	67·7	19·4	44·8
In superphosphate	—	—	16·2	—
In sulphate of potash	—	—	—	32·5
In guano	1·0	1·0	1·0	0·2
In nitrate of soda	20·2	20·2	—	—
Total	75·3	88·9	36·6	77·5
In hay removed	57·0	57·0	15·2	60·8
More (+), or less (—), in manure than in crops	+18·3	+31·9	+21·4	+16·7
7 years, 1882-1888.				
In dung	57·6	71·9	20·7	47·7
In superphosphate	—	—	9·1	—
In sulphate of potash	—	—	—	28·5
In guano	0	0	0	0
In nitrate of soda	10·4	10·4	—	—
Total	68·0	82·3	29·8	76·2
In hay removed	72·4	72·4	19·3	77·2
More (+), or less (—), in manure than in crops	—4·4	+9·9	+10·5	—1·0
Total period—23 years, 1866-1888.				
In dung	48·8	61·0	17·5	40·4
In superphosphate	—	—	9·8	—
In sulphate of potash	—	—	—	23·0
In guano	3·1	3·1	3·1	0·7
In nitrate of soda	14·2	14·2	—	—
Total	66·1	78·3	30·4	64·1
In hay removed	58·2	58·2	15·5	62·1
More (+), or less (—), in manure than in crops	+7·9	+20·1	+14·9	+2·0

mated to supply more phosphoric acid than was removed in the crops; and, taking the dung and artificial manures together, there was, taking the average of the whole period, nearly twice as much supplied in manure as removed in the crops.

Lastly, as to the *potash*:—It was only over the second period, when the largest amount of artificial potash-manure was employed, and when the hay crops had not reached their maximum, that the calculations show an excess of potash supplied in manure. Over the first period there was a considerable, and over the third period there was a slight, deficiency of supply. It is further of interest to observe that over neither period was the dung alone estimated to supply anything like the amount of potash removed in the crops; whilst over the whole period it did not supply two-thirds as much as was removed in the hay. Taking the whole period of 23 years, there is, in dung and artificial manures together, an average of only 2 lbs. more potash supplied per acre per annum than was taken off in crops.

The calculations show, therefore, that the manures supplied considerably more nitrogen and phosphoric acid, but only about as much potash, as the crops removed.

It is seen that the estimates for the whole period show an average of 58·2 lbs. of nitrogen, 15·5 lbs. of phosphoric acid, and 62·1 lbs. of potash, removed in the crops, per acre per annum. On this point it may be stated that the Rothamsted experiments on the continuous growth of grass without manure have shown that, in first crops of hay alone, more than 30 lbs. of nitrogen, and nearly 30 lbs. of potash, are, on the average, annually removed in the crops so grown for many years in succession on the Rothamsted soil; and it is to be supposed that something like these amounts would be available to the growing grass crops under consideration.

Upon the whole, it may be concluded that, under the conditions of manuring provided, there would be accumulation within the soil both of nitrogen and phosphoric acid, though but little, if any, of potash. Indeed, the results afford a forcible illustration of how great is the exhaustion of potash when hay is sold, and how important it is that there should be adequate return either in dung or in artificial manures.

It has to be borne in mind, however, that whilst neither phosphoric acid nor potash is subject to any appreciable or material loss by drainage, the nitrogen of manures is subject to such loss. In the case of artificial nitrogenous manures, such as ammonia-salts and nitrate of soda, the loss may sometimes be very considerable when they are applied to arable land, when there is no crop actively growing, and in wet seasons when

there is much drainage. Under similar conditions, there may also be more or less loss from the soluble nitrogenous portion of dung. It is probable, however, that, in the case of the mixed herbage of grass-land, with a great variety of plants, having widely different root-ranges and habits of growth, and with vegetation going on to a greater or less extent almost the whole year round, there will be much less loss of nitrogen by drainage, even from artificial manures, than when they are applied to arable land—especially when such small quantities are used, and at the commencement of the active growth of the season, as in the case now under consideration; whilst it may be doubted whether there will generally be any material loss of nitrogen by drainage from farmyard manure or town dung applied to grass-land. But when dung is applied in excessive quantities to arable land, or to soil which becomes water-logged and is not sufficiently aerated, there may be more or less loss by the evolution of free nitrogen.

Changes within the Soil in the Formation of the Meadow.

Before discussing the experimental results obtained, relating to the changes which have taken place in the condition of the land during the formation of this particular meadow, it will be well to direct attention, in general terms, to the main distinctions between the soil of arable land and that of permanent grass.

If we examine arable land after the removal of a grain crop, we find that the amount of roots left in the soil is very small. Thus, in a case in which a large crop of barley had been grown, four samples of soil were taken, each 12 inches square and 9 inches deep, and from each the roots were very carefully separated. The calculation of the results showed an average of only 536 lbs. of roots per acre in the surface-soil to the depth of 9 inches. Of above-ground residue, or stubble, there was on the average 1,104 lbs. per acre. The nitrogen in the stubble and in the roots of the surface-soil, taken together, amounted to only about $8\frac{1}{2}$ lbs. per acre. Where, in the same field, clover had grown, there was, on the other hand, an average of 3,107 lbs., or nearly 1 ton 8 cwts. of roots per acre, in the first 9 inches of depth; and there was 2,669 lbs., or nearly 1 ton 4 cwts., of above-ground residue; and the nitrogen in the two together was more than 90 lbs. per acre. There was, besides, a greater amount of roots, and of nitrogen in them, in the second and third 9 inches than in the case of the barley-ground.

When land is laid down to permanent grass the seeds are more frequently sown with barley than with any other crop; and after a certain number of years, greater or less according to

soil and treatment, when the meadow may be said to be formed, it is found that the soil contains very much more vegetable matter—amounting, in fact, to many thousands of pounds per acre in the first 9 inches of depth. Thus, in the case of some of the experimental plots of the old grass-land at Rothamsted, samples have been taken to the depth of 9 inches, the whole of the above-ground growth having been first carefully cut off by scissors, and the vegetable matter remaining in the soil picked out by hand. The average of twenty-four such determinations indicated 16,601 lbs. (nearly $7\frac{1}{2}$ tons) of vegetable matter per acre; and in one case the amount was 24,548 lbs., or nearly 11 tons per acre. The nitrogen in this residue amounted, on the average of the 24 samples, to about 125 lbs. per acre, and in the case of the maximum amount of residue, to about 180 lbs.

Again, the nitrogen in the first 9 inches of the soil of the barley-land above referred to, after the roots had been separated, amounted to 0·1416 per cent. in the fine dry soil, the average weight of which was about 2,600,000 lbs. per acre to the same depth; so that the amount of nitrogen in it would correspond to about 3,682 lbs. per acre. The nitrogen in the fine dry soil of the clover-land was 0·1566 per cent., which, reckoned on the same weight of surface-soil, corresponds to 4,072 lbs. per acre to the depth of 9 inches. On the other hand, the surface-soil of the old grass-land, which yielded the amounts of roots above referred to, indicated, for the average of the 24 samples, 0·2346 per cent. of nitrogen; but the weight of fine dry soil—that is, excluding stones, roots, and water—amounted to an average of only about 2,000,000 lbs. per acre to the depth of 9 inches. Hence the amount of nitrogen to that depth would be about 4,692 lbs., or much more than in the case of the clover-land, and very much more than in that of the barley-land, though with much less soil. The highest amount of nitrogen found in the surface-soil of any of the experimental grass plots was, however, 0·2737 per cent., corresponding to 5,474 lbs. of nitrogen per acre on a weight of 2,000,000 lbs.

With the increase of nitrogen, as the arable land is converted into meadow, there is also a considerable increase of carbon. Thus, in the surface-soil of the experimental grass-plots at Rothamsted, there are about 13 or 14 parts of carbon to 1 of nitrogen; whereas, in the case of the Rothamsted arable surface-soils, there are only from 10 to 11 parts of carbon to 1 of nitrogen, and in the subsoils much less. The relation of carbon to nitrogen in the surface-soil is, however, very much less than in the vegetation above it, and very much less than in the roots separated from it. Both the nitrogen and the carbon of the

soil have been derived from vegetable residue, partly of the manure applied, but in great part also of the crops grown; and it has undergone decomposition, and thereby lost most of its carbon, whilst what remains exists in more stable combination.

Such accumulations are retained in the soil with great tenacity, and they contribute to its fertility. From the unmanured plot of the Rothamsted permanent grass experiments, taking first and second cuttings together, 43 crops of hay have been removed during the last 33 years; but the greater part of the long previously accumulated fertility still remains. When, however, grass-land is broken up and converted into arable, the accumulated fertility rapidly diminishes.

When it is borne in mind that all our arable soils were originally covered with natural herbage or timber, and that during centuries of arable culture much of the previously accumulated fertility has thereby been removed, it will readily be understood that, in the re-conversion of such arable land into permanent grass, much of the used-up accumulated fertility must be restored, before we can get it back into a satisfactory condition.

Assuming these to be the general conditions essential for the conversion of arable into permanent grass-land, we may now endeavour to ascertain what changes have actually taken place in the soil, during the formation of the meadow, the history of which we have under consideration. Any estimate of the accumulations which have taken place can, however, only be approximately correct, since we have not any exact data on the important point of the amount of nitrogen which the soil contained when it was first taken in hand in 1856 as arable land.

But we have made some thousands of determinations of nitrogen in the surface-soils and subsoils of the Rothamsted experimental fields, which are very near to this newly formed meadow; and we are in a position, therefore, to make a fair estimate on the subject.

Careful samples were, however, taken in January 1879—that is, when no crop had been removed since the previous July—and again in September 1888, after a second crop of hay had been taken. It will be instructive to go into some detail as to the methods of experimenting adopted, and the results obtained, as the discussion will illustrate some of the difficulties which are encountered in endeavouring properly to interpret analyses of soils made on samples taken at different periods, and in different conditions of the land.

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The plan adopted in taking the samples is, to drive down a steel frame, 12 by 12 inches, and 9 inches deep, open at top and bottom, until the upper edge is level with the surface of the soil. All above-ground vegetation is then cut off as closely as possible with scissors. The soil enclosed within the frame is then carefully removed, exactly to the depth of the frame, and immediately weighed. The soil is then partially dried, and submitted to mechanical separation by a series of sieves. All visible vegetable matter is at the same time carefully picked out. The stones, the roots, and the remaining soil, are thus obtained separately; and the determinations of dry matter, of nitrogen, and sometimes of carbon, and of other constituents, are made in the separated soil after being finely powdered. The loss of water at each stage of preparation, and on drying the samples as analysed, is also carefully determined.

In January 1879 six samples from so many different places in the field were taken, and in September 1888 five samples. Table IV. (below) shows, in the upper division for each of the

TABLE IV.—SOIL SAMPLES COLLECTED JANUARY 1, 1879, AND SEPTEMBER 26, 1888.

Quantities per acre.

Samples	Original soil as sampled	Stones, &c.	Roots, &c.	Water	Fine soil (dry)
<i>Samples collected January 1, 1879.</i>					
	lbs.	lbs.	lbs.	lbs.	lbs.
1	3,642,024	800,061	10,400	769,040	2,062,523
2	3,680,139	916,012	12,741	761,757	1,989,629
3	3,647,469	894,613	8,875	762,057	1,981,924
4	3,708,726	823,638	11,816	765,204	2,108,068
5	3,771,343	1,028,125	9,529	782,051	1,951,638
6	3,735,951	983,258	16,008	778,961	1,957,724
Mean	3,697,609	907,618	11,561	769,846	2,008,584
<i>Samples collected September 26, 1888.</i>					
1	3,360,926	1,002,969	10,346	549,603	1,798,008
2	3,422,183	1,035,367	11,707	550,863	1,824,246
3	3,170,351 ¹	878,279	7,623	423,327	1,861,122
4	3,449,408	752,771	9,801	627,722	2,059,114
5	3,431,711	852,551	12,523	564,235	2,002,402
Mean	3,366,915	904,387	10,400	543,150	1,908,978

¹ Probably too little, as the soil appeared to rise in the sampling iron, owing, as was afterwards found, to a large stone directly under the edge of the frame; probably part of this stone should have been included in the weight of sample.

six 1879 samples, and in the lower division for each of the five 1888 samples, the calculated amounts per acre of the total soil as sampled, of the stones, the roots, the water, and, finally, of the fine soil free of water.

It will be seen that, according to the calculations, the average weight of total soil per acre, to the depth of 9 inches, was about 330,000 lbs., or about one-eleventh less in September 1888 than in January 1879. An examination of the amounts of water shows that about two-thirds of the difference was due to the less amount of moisture in the soil of the 1888 samples, taken in September, and after the removal of a second crop of hay, than in those taken in January 1879, six months after the removal of the crop. The remaining difference, amounting to rather more than 100,000 lbs., is made up by rather over 3,000 lbs. less stones, rather over 1,000 lbs. less roots, and very nearly 100,000 lbs. less dry soil; corresponding, in fact, to about 5 per cent., or one-twentieth less dry soil in 1888 than in 1879.

It may be observed that the difference in the amount of water per acre, to the depth of 9 inches, at the two periods, corresponds to a difference of almost exactly 1 inch less rain retained in the first 9 inches of depth in September 1888 than in January 1879; and the less amount of soil removed at the later date is probably, in great part, due to less consolidation of the drier soil. The average amounts of water represent about 20·8 per cent. of the soil as sampled in 1879, but only 16·1 per cent. in 1888.

It is seen that, on the average, the stones amounted in 1879 to nearly one-fourth, but in 1888 to more than one-fourth of the total soil as sampled; and, in each case, the stones amounted to not far short of half as much as the fine dry soil, which is a larger proportion than has been found in any, and a much larger proportion than in most, of the surface-soils, of the Rothamsted experimental arable fields. The amounts varied, however, considerably according to the different samples, and more in those taken in 1888 than in those of 1879.

The amount of roots also varied considerably in the different samples, but more in 1879 than in 1888; the quantity corresponding in one case in 1879 to 8,875 lbs. per acre, and in another to 16,008 lbs.; whilst in 1888 the greatest difference was from 7,623 lbs. in one case, to 12,523 lbs. in another. On the average there was about one-eleventh less roots in 1888 than in 1879; whilst we should expect an increase with the progress in the formation of the meadow. Part of the difference is accounted for by the less amount of total soil taken to the depth of 9 inches in the drier state of the soil in 1888; and it

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is probable that some of the deficiency may be due to the roots being more exhausted after the removal of a second crop in September, than in January after no removal by mowing since the preceding summer. The amount of nitrogen in the roots at the two periods will be considered further on.

The amount of water varied comparatively little in the six samples taken in January 1879, but more, with the less actual quantities, in the five samples of 1888.

Lastly, as to the fine soil free from water, the variation in the amount in the different samples has obviously some relation to the amount of stones; but, taking the average, the 1879 samples represent 2,008,584 lbs., and the 1888 samples only 1,908,978 lbs., or, as has been said, about one-twentieth less. The significance of this difference will be seen as we proceed.

Two or more determinations of nitrogen were made in each separate sample, in each of the two years, and also in a mixture of the six samples of 1879, and of the five of 1888. The following Table (V.) gives the mean percentage of nitrogen in each separate sample, and in the mixture for each year. It also gives the amounts of nitrogen per acre, in lbs., to the depth of 9 inches, calculated from these percentages, and the actual weights of soil in each case, as given in the preceding Table, and, for convenience, repeated in the first two columns of the Table below.

TABLE V.—NITROGEN PER CENT., AND PER ACRE, IN THE SURFACE-SOILS TO THE DEPTH OF 9 INCHES, IN JANUARY 1879, AND SEPTEMBER 1888.

Samples	Fine soil (dry) per acre		Nitrogen			
			Per cent.		Per acre	
	1879	1888	1879	1888	1879	1888
	lbs.	lbs.	per cent.	per cent.	lbs.	lbs.
No. 1	2,062,523	1,798,008	0·1975	0·2477	4,073	4,454
„ 2	1,989,629	1,824,246	0·2013	0·2388	4,005	4,356
„ 3	1,981,924	1,861,122	0·2112	0·2614	4,186	4,865
„ 4	2,108,068	2,059,114	0·1942	0·2380	4,094	4,901
„ 5	1,951,638	2,002,402	0·2048	0·2255	3,997	4,515
„ 6	1,957,724	—	0·2051	—	4,015	—
Mean . . .	2,008,584	1,908,978	0·2024	0·2423	4,062	4,618
Mixture . . }	—	—	0·2057	0·2405	4,132	4,591
Mean of mean and mixture }	—	—	0·2041	0·2414	4,097	4,604

Referring first to the 1879 results, the percentage of nitrogen is not widely different in the different samples. The highest is 0·2112 per cent. in sample 3, and the lowest 0·1942 in sample 4.

But with the higher percentage the weight of fine dry soil per acre was only 1,981,924 lbs., whilst with the lower it was 2,108,068 lbs.; so that there is only a difference of from 4,186 to 4,094, or 92 lbs., in the calculated quantity of nitrogen per acre in the two cases. There can be little doubt that the lower percentage in the sample of greater actual weight of fine dry soil was due partly, at any rate, to the inclusion of a greater quantity of subsoil which would contain a lower percentage of nitrogen. The percentage of nitrogen according to the mean of the determinations on the six individual samples is 0.2024, and according to the determinations on a mixture of the six samples it is 0.2057, showing a difference, therefore, of only 0.0033 per cent.

The calculated quantities per acre are, according to the mean of the determinations on the six individual samples, 4,062 lbs. per acre, and according to the determinations on the mixture 4,132 lbs., or a difference of 70 lbs. on a total quantity of about 4,100 lbs.

Turning to the 1888 results, the difference in the percentage of nitrogen in the different samples is rather greater than in those of 1879; and there is again some, but not an uniform, indication of higher percentage with lower weight of soil, and lower percentage with higher weight—that is, with probably more subsoil included. The mean percentage on the individual samples is 0.2423, and on the mixture 0.2405, or a difference of only 0.0018 per cent.

There is also a greater difference in 1888 than in 1879 in the calculated amounts of nitrogen per acre from the different samples; but there is very little difference between the average result on the five individual samples, and that on the mixture—it being 4,618 lbs. according to the analyses and calculations on the separate samples, and 4,591 lbs. according to the results on the mixed sample—that is, there is a difference of only 27 lbs. per acre, in a total of about 4,600 lbs.

Taking the results as they stand—though, as we shall see further on, they will require some modification before being finally adopted—the average percentage of nitrogen in the 1879 samples was 0.2041, but in the 1888 samples 0.2414, or about one-fifth higher, after nearly ten years. Or, taking the calculated amounts of nitrogen per acre to the depth of 9 inches, they were 4,097 lbs. in 1879, and 4,604 lbs. in 1888; showing an increase, therefore, of 507 lbs. in the nearly ten years, or about 50 lbs. per acre per annum, during so many years of the further progress in the formation of the meadow.

Before referring further to these results, we must endeavour to arrive at some estimate of the amount of nitrogen in the surface-soil when it was first taken in hand as arable land. As

already said, no samples were taken at the commencement; but having taken so many samples of our arable soils to the depth of 9 inches, and determined the nitrogen in them, we believe we may safely assume that, at the commencement, the arable surface-soil would, to that depth, contain about 0.14 per cent. of nitrogen.

But the average weight of fine dry soil, to the depth of 9 inches, would, when arable, weigh about 2,400,000 lbs. per acre, instead of about 2,000,000 lbs. as in the case of the land after it had been so many years under grass. We have, therefore, to estimate what would probably be the percentage of nitrogen in the upper 2,000,000 lbs. of the surface arable soil. That is to say, we have, in the first place, to deduct 400,000 lbs., or one-sixth of the original weight, and to deduct the amount of nitrogen it would contain from the total, and calculate the percentage in the remaining upper 2,000,000 lbs. Taking the original 2,400,000 lbs. at 0.14 per cent. of nitrogen, the total amount to the depth of 9 inches would be 3,360 lbs. of nitrogen per acre. Assuming the lower inch and a half, or one-sixth = 400,000 lbs., which would be below the reach of the plough, to contain only 0.08 per cent. of nitrogen, the total amount of nitrogen in it would be 320 lbs. per acre; and deducting this from the total 3,360 lbs., there remain 3,040 lbs. in the upper 2,000,000 lbs. of the fine dry soil of the arable land at the commencement, and this would correspond to a percentage of 0.152 in the 2,000,000 lbs. of surface-soil.¹

We have thus an estimate of the percentage, and of the total amount, of nitrogen in 2,000,000 lbs. of fine dry arable surface-soil in 1856, when the land was taken in hand; we have actual determinations in the surface-soil, weighing rather over 2,000,000 lbs. in 1879; and we have actual determinations in 1888, when, however, the fine dry soil to the depth of 9 inches amounted to little more than 1,900,000 lbs. Before, therefore, we can make any accurate comparison of the amounts of nitrogen at the different dates, we must correct the results of the actual determinations, so as to show the amount in 2,000,000 lbs. For example, we assume that the about one-twentieth, or nearly 100,000 lbs. deficiency of weight per acre in 1888, being subsoil, but influenced more or less by the perennial vegetation, would contain about 0.09 per cent. of nitrogen, and the calculation is as follows:—91,000 lbs. of subsoil, at 0.09 per cent. nitrogen = 82 lbs. of nitrogen per acre, which added to 4,604 lbs., the amount by actual determination in 1,908,978 lbs., gives a total of 4,686 lbs. nitrogen in

¹ It is perhaps more probable that these estimates of the percentage, and of the actual amount, of nitrogen in the surface soil in 1856, are too high than too low.

2,000,000 lbs. of soil, corresponding to 0·234 per cent. in the 2,000,000 lbs., instead of 0·2414 per cent. on 1,908,978 lbs. as given in Table V. of the actual experimental results.

It will be seen, therefore, that in endeavouring to estimate the loss or gain in the nitrogen of a surface-soil, under any particular mode of treatment, we have to face a very complicated problem, and one which is not generally recognised. It is, however, essential to meet the difficulty, if we would arrive at anything like trustworthy conclusions.

Adopting the plan of calculation above described, we have—reckoning in each case 2,000,000 lbs. of dry surface-soil per acre—estimates of the percentage of nitrogen, and of the actual amounts of it, in lbs. per acre, in 1856, when the land was arable; estimates for 1866, the time from which our records of manure and produce commence; direct determinations in 1879, when the first samples were taken; and direct determinations also for 1888, when the last samples were taken and analysed. The following Table shows the results so obtained, and also the estimated gain of nitrogen, per acre per annum, over individual periods, and the total period:—

TABLE VI.—NITROGEN PER CENT. IN SURFACE-SOIL (DRY); ALSO ACTUAL QUANTITIES AND GAIN, IN LBS. PER ACRE, AT DIFFERENT PERIODS.

Dates	Number of years	Nitrogen			
		Per cent. in surface-soil (dry)	Per acre total	Gain	
				Per acre total	Per acre per annum
1856	—	per cent. 0·1520	lbs. 3,040	lbs. —	—
1866	10	0·1749	3,497	457	} 45·7
1879	13	0·2046	4,091	594	
1888	10	0·2345	4,690	599	
—	33	—	—	1,650	50·0

Taking into consideration both the treatment of the land as to manuring, and the amounts of crop grown, there can be no doubt that there would be greater accumulation of nitrogen within the surface-soil over the later than over the earlier years; and it is seen that, according to the calculations, there was an estimated average gain of 45·7 lbs. per acre per annum over the period from 1856 to 1879, but of 59·9 lbs. per acre per annum over the last ten years. It is probable that the average gain was rather less per acre per annum over the first ten years, and

rather more over the next thirteen, than over the total period of twenty-three years, from 1856 to 1879. The estimate for the concluding period from 1879 to 1888 (reckoned at ten years from the removal of the crop of 1878) is, however, founded on direct experimental data, and is probably very near the truth. The average annual gain over the 33 years, 1856 to 1888, is seen to be 50·0 lbs. per acre; and the average over the 23 years from 1866 to 1888, to which our records of manure and produce relate, is 51·9 lbs.

The gain so indicated is obviously independent of the visible and separated underground vegetable matter, roots, &c. The following Table (VII.) shows the amounts of roots per acre in the surface-soil, the percentage of nitrogen in them, and the amounts of nitrogen per acre, according to the results on each sample in 1879 and in 1888 respectively:—

TABLE VII.—SEPARATED ROOTS PER ACRE, AND NITROGEN IN THEM, PER CENT. AND PER ACRE.

Sample	Roots per acre		Nitrogen in roots (air-dried)			
			Per cent.		Per acre	
	1879	1888	1879	1888	1879	1888
	lbs.	lbs.	per cent.	per cent.	lbs.	lbs.
1	10,400	10,346	0·740	0·771	77·0	79·8
2	12,741	11,707	0·696	0·800	88·7	93·6
3	8,875	7,623	0·804	0·805	71·4	61·4
4	11,816	9,801	0·795	0·644	93·9	63·1
5	9,529	12,523	0·802	0·731	76·4	91·6
6	16,008	—	0·766	—	122·6	—
Mean	11,561	10,400	0·767	0·750	88·3	77·9

Attention has already been called to the fact that, although the soil had undoubtedly increased in fertility during the last 10 years, as proved both by the increased amounts of crop, and by the increased amount of nitrogen in the surface-soil, yet there was even a somewhat less amount of roots separated from the samples of soil in 1888 than in 1879. It was supposed probable that part of the result might be due to the roots being more exhausted in September 1888, after the removal of two large crops, than in January 1879, when no hay-crop had been removed since the preceding summer. It may be, however, that the separation of fine vegetable matter was more complete in the case of the 1879 than in that of the 1888 samples; and, so far as this was so, a small portion of the increased amount of nitrogen found in the fine dry soil in 1888 would be due to

such fine vegetable *débris*. Against such a supposition is the fact that determinations of carbon in the mixture of the six 1879 and of the five 1888 soil samples show scarcely any increased relation of carbon to nitrogen at the later date, the amounts being 11.73 carbon to 1 of nitrogen in 1879, and only 11.77 in 1888. Compared with these amounts, as already stated, there are from 13 to 14 parts of carbon to 1 of nitrogen in the surface-soil of the old grass-land at Rothamsted.

At any rate, the figures in Table VII. show that the average amounts of nitrogen per acre due to separated roots were rather less at the later date, being 88.3 lbs. in 1879, and only 77.9 lbs. in 1888. These amounts are much less than were attributable to separated roots in the case of the old grass-land.

Upon the whole, therefore, the evidence clearly indicates that there is much less accumulation of vegetable *débris* in the surface-soil of the new, than in that of the old grass-land. As to the actual amounts of nitrogen due to vegetable accumulation in the surface-soil, if the whole amount were distributed over the 33 years, it would represent less than 3 lbs. per acre per annum. But, obviously, a larger part of the earlier than of the later accumulations will have been decomposed, and will have contributed to the increase of nitrogen and carbon found in the fine soil. Hence, more than the above calculated average amount, both of vegetable *débris* and of nitrogen in it, will be due to the later years. Still, the amounts of nitrogen due to such accumulations of visible and separable vegetable matter will not add many lbs. per acre per annum to the amounts remaining and found in the fine soil itself.

From the whole of the results there can be no doubt that there has been a considerable accumulation of nitrogen in the surface-soil during the formation of the meadow—amounting, in fact, to an average of nearly 52 lbs. per acre per annum over the last 23 years. The question arises—whence has this nitrogen been derived?

In Table III. it was shown that, on the assumption of the lower percentage of nitrogen (0.64) in the dung applied, there were 7.9 lbs. more nitrogen annually supplied in manure than were removed in the crops, over the 23 years 1866 to 1888; but that, on the assumption of the higher percentage of nitrogen in the dung (0.80), there were about 20 lbs. (20.1) more annually supplied than were removed in the crops; or, even if we were to suppose that the dung contained 1.0 per cent. of nitrogen, the excess in manure over that in the crops would only amount to 35.4 lbs. per acre per annum.

It is obvious that, even supposing there were no loss of the

supplied nitrogen, either by decomposition within the soil and evolution of free nitrogen, or by the drainage of nitric acid, the estimated excess in the manure over that in the crops removed would not account for the indicated gain of nitrogen by the surface-soil, and in the roots. We may also reckon that the meadow received nitrogen at the rate of about 5 lbs. per acre per annum, by cake or corn given to the animals feeding off the second crops. There will also be from 5 to 10 lbs. per acre per annum, due to combined nitrogen coming down in rain and the minor aqueous deposits from the atmosphere.

Making full allowance for the various sources that have been enumerated, there would still appear to be a greater or less balance of the gain not so accounted for. If so, it must have its source, either in the subsoil, or the atmosphere, or both.

There is much experimental evidence pointing to the conclusion that, at any rate some deep-rooted leguminous plants derive a considerable quantity of nitrogen from the subsoil; and there seems no reason to doubt that the deep-rooting plants of the mixed herbage of grass-land, whether leguminous or otherwise, may also avail themselves of subsoil nitrogen; and, if so, it is to be supposed that they, like clover for example, will leave nitrogenous crop-residue in the surface-soil, the nitrogen of which has been derived from the subsoil.

It is, indeed, very probable that, at any rate the greater part, if not the whole, of the nitrogen gained by the surface-soil, and not accounted for by the excess supplied in manure over that removed in crops, or by combined nitrogen from the atmosphere, is due to nitrogen of the subsoil. But if the whole is not to be so accounted for, the question remains—whether some may not be derived in some way from the free nitrogen of the atmosphere?

On this point we think it may safely be concluded, from the results of the experiments of Boussingault, and of those made at Rothamsted, many years ago, that our agricultural plants do not themselves directly assimilate the free nitrogen of the air by their leaves. But in recent years the question has assumed quite a new aspect. It now is, whether the free nitrogen of the atmosphere is brought into combination within the soil, under the influence of micro-organisms, or other low forms, and so serving indirectly as a source of nitrogen to plants of a higher order?

Thus, Hellriegel and Wilfarth have found, in experiments with various leguminous plants, that if a soil free of nitrogen have added to it a small quantity of soil-extract containing the organisms, the plants will fix much more nitrogen than was

otherwise available to them in the combined form. It further seemed probable, that the growth and crop-residue of certain plants favoured the development and action of special organisms. It is admittedly not yet understood, either in what way the lower organisms affect the combination, or in what way the higher plants avail themselves of the nitrogen thus brought into combination.

Thinking that such results, if confirmed, were of very great significance, and the conclusions to be drawn from them were of fundamental importance, we decided to institute experiments at Rothamsted on somewhat similar lines. An initiative series has already been undertaken. At present, however, the analytical results are not complete; but, so far as they go, they seem to indicate the probability that there has been some gain of nitrogen beyond that supplied in the combined form, in the soil and in the seed sown. It is remarkable, however, that in the experiments of Hellriegel and Wilfarth they have not succeeded in enhancing the assimilation of nitrogen by red clover by such means. The plants with which their most striking results have been obtained are peas and lupins; and it is with peas that the indications have been obtained at Rothamsted. Should it be finally established, that such an action does take place in the case of certain plants, though not in that of others, it is obvious that part at any rate of the gain of nitrogen by the soil supporting the mixed herbage of grass-land, may be due to the free nitrogen of the air brought into combination under the influence of the action supposed.

The Botany of the Meadow.

Botanical separations in samples of the herbage have not been undertaken; but careful examinations of its character have been made from time to time by Mr. J. J. Willis, who conducts the botanical work of the Rothamsted experiments; and Table VIII. (page 22) gives the results of his estimates, made in November 1868, and in eleven recent years a short time before cutting, of the five most prominent grasses, the four most prominent leguminous plants, and the four most prominent miscellaneous or weedy species. It will be seen that, with the exception of 1877 and 1884, the recent seasons were 1876-88.

Before referring to the results relating to recent years, attention should be directed to the notes taken at the earlier period, namely in 1868. It was then stated, that *Dactylis glomerata* (cock's-foot) was plentiful, *Poa pratensis* (smooth-stalked meadow-grass) abundant and luxuriant, *Lolium perenne* (perennial rye-

TABLE VIII.—ORDER OF PREDOMINANCE OF THE MOST PROMINENT SPECIES IN THE MIXED HERBAGE.

ORDER OF PREDOMINANCE				
	First	Second	Third	Fourth
<i>Gramineæ</i>				
1868	<i>Dactylis glomerata</i>	<i>Poa pratensis</i>	<i>Lolium perenne</i>	<i>Festuca ovina</i>
1876	<i>Holcus lanatus</i>	<i>Festuca ovina</i>	<i>Poa pratensis</i>	<i>Anthoxanthum odoratum</i>
1878	<i>Bromus mollis</i>	<i>Lolium perenne</i>	<i>Alopecurus pratensis</i>	<i>Holcus lanatus</i>
1879	<i>Anthoxanthum odoratum</i>	<i>Avena flavescens</i>	<i>Anthoxanthum odoratum</i>	<i>Poa trivialis</i>
1880	<i>Alopecurus pratensis</i>	<i>Anthoxanthum odoratum</i>	<i>Poa pratensis</i>	<i>Holcus lanatus</i>
1881	<i>Poa trivialis</i>	<i>Avena flavescens</i>	<i>Festuca ovina</i>	<i>Holcus lanatus</i>
1882	<i>Bromus mollis</i>	<i>Festuca ovina</i>	<i>Lolium perenne</i>	<i>Anthoxanthum odoratum</i>
1883	<i>Holcus lanatus</i>	<i>Alopecurus pratensis</i>	<i>Festuca ovina</i>	<i>Lolium perenne</i>
1885	<i>Avena flavescens</i>	<i>Holcus lanatus</i>	<i>Bromus mollis</i>	<i>Festuca ovina</i>
1886	<i>Alopecurus pratensis</i>	<i>Holcus lanatus</i>	<i>Festuca ovina</i>	<i>Avena flavescens</i>
1887	<i>Poa trivialis</i>	<i>Avena flavescens</i>	<i>Poa pratensis</i>	<i>Lolium perenne</i>
1888	<i>Alopecurus pratensis</i>			<i>Holcus lanatus</i>
<i>Leguminosæ</i>				
1868	<i>Trifolium repens</i>	<i>Lotus corniculatus</i>	<i>Trifolium pratense</i>	<i>Lathyrus pratensis</i>
1876	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Lotus corniculatus</i>	<i>Lathyrus pratensis</i>
1878	<i>Trifolium pratense</i>	<i>Trifolium repens</i>	<i>Lotus corniculatus</i>	<i>Medicago lupulina</i>
1879	<i>Trifolium repens</i>	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Lathyrus pratensis</i>
1880	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Trifolium repens</i>	
1881	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Trifolium repens</i>	
1882	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Trifolium repens</i>	
1883	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Trifolium repens</i>	
1885	<i>Trifolium pratense</i>	<i>Trifolium minus</i>	<i>Trifolium minus</i>	<i>Lotus corniculatus</i>
1886	<i>Trifolium repens</i>	<i>Trifolium minus</i>	<i>Trifolium pratense</i>	<i>Lathyrus pratensis</i>
1887	<i>Trifolium pratense</i>	<i>Trifolium minus</i>	<i>Lathyrus pratensis</i>	
1888	<i>Trifolium pratense</i>	<i>Trifolium repens</i>	<i>Trifolium minus</i>	
<i>Species of Other Orders.</i>				
1868	<i>Rumex acetosa</i>	<i>Plantago lanceolata</i>	<i>Ranunculus acris</i> & <i>bulbosus</i>	<i>Hypochaeris radicata</i>
1876	<i>Ranunculus bulbosus</i>	<i>Hypochaeris radicata</i>	<i>Bellis perennis</i>	<i>Chrysanthemum leucanthemum</i>
1878	<i>Ranunculus bulbosus</i>	<i>Plantago lanceolata</i>	<i>Bellis perennis</i>	<i>Taraxacum officinale</i>
1879	<i>Ranunculus bulbosus</i> & <i>acris</i>	<i>Rumex acetosa</i>	<i>Plantago lanceolata</i>	<i>Cerastium triviale</i>
1880	<i>Conopodium denudatum</i>	<i>Luzula campestris</i>	<i>Rumex acetosa</i>	<i>Ranunculus acris</i>
1881	<i>Rumex acetosa</i>	<i>Ranunculus bulbosus</i>	<i>Cerastium triviale</i>	<i>Achillea millefolium</i>
1882	<i>Rumex acetosa</i>	<i>Ranunculus bulbosus</i>	<i>Cerastium triviale</i>	<i>Achillea millefolium</i>
1883	<i>Rumex acetosa</i>	<i>Chrysanthemum leucanthemum</i>	<i>Bellis perennis</i>	<i>Achillea millefolium</i>
1885	<i>Ranunculus bulbosus</i>	<i>Rumex acetosa</i>	<i>Ranunculus acris</i>	<i>Cerastium triviale</i>
1886	<i>Rumex acetosa</i>	<i>Ranunculus bulbosus</i>	<i>Cerastium triviale</i>	<i>Anthriscus sylvestris</i>
1887	<i>Achillea millefolium</i>	<i>Rumex acetosa</i>	<i>Anthriscus sylvestris</i>	<i>Ranunculus acris</i> & <i>bulbosus</i>
1888	<i>Rumex acetosa</i>	<i>Cerastium triviale</i>	<i>Achillea millefolium</i>	<i>Ranunculus acris</i> & <i>bulbosus</i>

grass) was third in prominence, *Festuca ovina* (sheep's-fescue) plentiful, and *Holcus lanatus* (woolly soft grass), *Agrostis vulgaris* (common bent grass), and *Bromus mollis* (soft brome-grass), were freely distributed. Leguminous species were found to be very abundant; *Trifolium repens* (white clover) and *Lotus corniculatus* (bird's-foot trefoil) being exceedingly prominent, especially the latter. *Trifolium pratense* (red clover) was less abundant, and but little of *Lathyrus pratensis* (meadow vetchling) was observed. Miscellaneous species were in fair amount; *Rumex acetosa* (sorrel dock), *Taraxacum officinale* (dandelion), *Plantago lanceolata* (ribwort plantain), and *Ranunculus repens* and *bulbosus* (buttercups), were the most characteristic. In all, 13 grasses, 4 leguminosæ, and 29 miscellaneous species, making a total of 46, were observed.

In 1876, that is, eight years later, *Dactylis* was not among the five most prominent grasses nor did it reach that degree of prominence in any one of the last ten years. *Lolium perenne*, again, which was rather prominent in the early years, and was third in prominence in 1868, was not among the first five in 1876, was, however, second in 1878, was not placed in 1879, was only fifth in 1880, was not placed in 1881, was third in 1882, fifth in 1883, not placed in 1885 or 1886, was only fifth in 1887, and was not placed in 1888. Both cock's-foot and ryegrass have, therefore, much diminished in prominence under constant mowing; whilst among the better grasses, *Alopecurus pratensis*, *Avena flavescens*, and the two *Poas*, attain and maintain a prominent place, but the less favourably reputed *Holcus lanatus* and *Festuca ovina* are more prominent still. Of leguminous plants, *Trifolium minus*, *T. pratense*, and *T. repens*, are the most prominent, whilst *Lotus* and *Lathyrus* are comparatively scarce. In fact, notwithstanding the mowing, the frequent application of dung, and the feeding of the after-grass, generally with a small quantity of purchased food, have tended to maintain a fair proportion of leguminous herbage; whilst, the more there was used of artificial nitrogenous manure, and the more luxuriant and stemmy the grasses were accordingly, the less was the proportion of leguminous herbage; and it was this fact that led to a reduction in the amount of nitrate of soda applied in later years. Upon the whole, weedy herbage is not prominent; but of such, *Ranunculus*, *Rumex*, and *Achillea* are the most so.

It appears, therefore, that neither *Dactylis* nor *Lolium* maintains any prominence when the herbage is annually mown. This result is entirely accordant with that obtained in the Rothamsted permanent grass experiments. In the early years *Dactylis* was the most prominent grass on the highly manured

plots, but it is now comparatively scarce, being mainly replaced by *Alopecurus* and *Avena elatior*. *Lolium*, too, has almost disappeared in recent years.

Upon the whole, it may be concluded from these results of annual mowing for nearly thirty years, that fair quality of herbage, as well as full quantity, may be maintained, provided judgment be exercised in the manuring. Indeed, it is seen that the quantity of crop is gradually increasing, indicating an improving condition of the land under the treatment followed.

Summary and General Conclusions.

1. By the judicious employment of manures, both natural and artificial, arable land has been converted into permanent grass, not only without loss, but with some profit to the tenant.

2. The important constituents, nitrogen and phosphoric acid, were supplied in the manures in larger quantities than they were removed in the crops; but potash in only about the same quantity as it was removed.

3. The application of dung, not only compensates for much of the exhaustion from the removal of hay, but it has a beneficial influence on the botanical character of the herbage.

4. Although the grass has been mown every year for nearly thirty years, there has been a considerable accumulation of fertility within the soil.

5. Analysis has shown that there has been an increase of nitrogen in the surface-soil, beyond that which could be explained by excess supplied in manure over that removed in crops, and by the combined nitrogen coming down in rain, and the minor deposits, from the atmosphere. Part, if not the whole, of this increase is probably derived from the subsoil by deep-rooted plants, which afterwards leave a nitrogenous residue within the surface-soil. Or, possibly, some of it may have its source in the free nitrogen of the atmosphere, brought into combination within the soil, under the influence of micro-organisms, or other low forms.

6. In laying down arable land to permanent grass, especially if hay is to be removed, it is essential to supply, not only nitrogenous, but an abundance of mineral manures, and especially of potash, a large quantity of which is removed in the crops, and must be returned. When the grass is not mown, but fed, the exhaustion is much less, but it is greater when consumed for the production of milk, than when for that of store or fattening increase.

II.—*Grass Experiments at Woburn.* By W. CARRUTHERS, F.R.S.,
P.L.S., Consulting Botanist to the Society.

I. EXPERIMENTS WITH SINGLE GRASSES IN THE STACKYARD
AND WARREN FIELDS.

WHEN the clover experiments were begun at Woburn in 1883, three plots, of one sixty-fourth of an acre each, were sown with ryegrasses. In 1885 these grasses had become so mixed with brome-grass that it was resolved to dig them up and re-sow them, and at the same time plots of similar size were sown with some of the better pasture grasses. In all, ten plots were sown, and the following seeds were used: Italian ryegrass, perennial ryegrass, and a variety of this known in the market as "annual" ryegrass, and said to be shorter-lived than the common plant; foxtail, cocksfoot, meadow fescue, tall fescue, timothy, rough-stalked meadow-grass, and smooth-stalked meadow-grass.

The experiments were carried on in duplicate, plots of the same size being employed in the Stackyard and Warren Fields. The Stackyard Field is a very light sandy loam, about nine inches deep, with a sandy subsoil; while the Warren Field is a firm clay loam, about eighteen inches deep, resting on a clay subsoil.

The seeds were sown on May 31 and June 1, 1886. The same number of germinating seeds of each of the grasses were employed for each plot, with the view of securing a similar number of plants for experiment. The two meadow-grasses failed to establish themselves in 1886, and they were re-sown in 1887, when they again failed. In 1888 also the two plots were again sown, and again failed. A fresh attempt will be made in the spring of this year (1889) to secure plots of these grasses.

The produce of the various plots in 1886 was so irregular, and the whole produce was so small, that it was not weighed. In 1887 all the plots were well covered with plants, with the exception of the meadow-grasses. The produce was carefully weighed and recorded.

No manure was given to the plots in 1887. In April of 1888 all the plots had a dressing of decorticated cotton-cake meal, at the rate of 5 cwts. to the acre.

In 1887 the ryegrasses produced a nearly equal crop. The foxtail and timothy did not reach the same amount as the ryegrasses; but the cocksfoot, meadow fescue, and tall fescue greatly exceeded them, so much so that two acres of cocksfoot would have produced as great a weight of food as three acres of ryegrass.

In 1888 all the grasses considerably increased the weight of food produced. This increase was so remarkable in the timothy and focktail that they made up not only for the deficiency of the first year, but in the totals of the two years each grass went beyond the totals of each of the ryegrasses. The cocksfoot, meadow fescue, and tall fescue increased in the second year at a considerably greater rate than the ryegrasses. And the result of the two years' growth shows that the three grasses just named produced above a half more food (52 per cent.) than the aggregate of the three ryegrasses.

Quantity calculated for an Acre of the total Green Produce of each Grass in both Plots in Stackyard and Warren Fields.

—	1887	1888	Rate of increase per cent.	Total of 1887 and 1888
	tons cwt. qrs. lbs.	tons cwt. qrs. lbs.		tons cwt. qrs. lbs.
Italian ryegrass . .	2 12 0 24	3 5 0 24	25	5 17 1 20
"Annual" ryegrass .	2 13 2 24	3 6 0 0	23	5 19 2 24
Perennial ryegrass .	2 9 2 8	3 1 3 12	25	5 11 1 20
Focktail	2 5 0 8	3 15 3 20	68½	6 1 0 0
Cocksfoot	3 16 1 20	5 14 3 4	50	9 11 0 24
Meadow fescue . .	3 3 0 6	4 7 0 16	38	7 10 0 22
Tall fescue . . .	3 10 3 12	5 18 0 24	67	9 9 0 8
Timothy	2 4 0 0	4 9 0 16	103	6 13 0 16

The Table shows that a pasture containing fair proportions of cocksfoot, meadow fescue, and tall fescue will in the first year yield a larger bulk of food than can be produced by ryegrass alone. It must be noted that influences producing a meagre and irregular crop in 1886, the year in which the seeds were put in, affected equally the ryegrasses and the other grasses. The gain in the production of food by the use of the perennial grasses is, however, much greater in the second year.

It would not, however, be proper to estimate the value of the food only by the bulk produced. A meadow consisting mainly of Yorkshire fog, which unhappily is not uncommon, would be, no matter how heavy the yield, of small feeding value. Even the chemical composition of the plants may be misleading, for, however large a proportion of assimilable carbohydrates and proteid compounds are discovered in a plant, they can be of no economic use if the stock refuse to eat the plant. The first real step in the investigation of the different grasses and other fodder plants must be made by observing what are selected by the stock. The attention of Linné was directed to this matter when he was travelling in Dalarne in 1734. Fifteen years afterwards he published in his *Pan Succus* an account of more than two thousand experiments made to discover what plants were

eaten and what rejected by cattle, sheep, horses, goats, and swine. He observed that of 494 plants offered to cattle, 276 species were eaten and 218 were rejected; of 387 species, sheep ate 246 and refused 141; and of 262 species, horses ate 50 and rejected 212. As a large proportion of the plants of Sweden are the same as those of England, Dr. Pulteney adapted Linné's essay to English readers, and published it in 1758. Since then careful observations have been made by Stillingfleet, Curtis, Sinclair, and others. And it was observations as to the selection by the sheep of plants in his pasture that led Mr. De Laune to employ and advocate the use of particular plants in laying down permanent pasture.

One important result, often overlooked, of the persistent rejection of certain elements in a pasture is the advantage thus obtained by these rejected elements for rapid multiplication. While the favourite plants are eaten down, and can be detected only by a sharp eye in the somewhat uniform short grassy foliage, the rejected plants, like the buttercup, Yorkshire fog, and dogstail, flower and fruit, cast their seeds about, and when unchecked rapidly increase, to the injury of the pasture. The abundance of Yorkshire fog, dogstail, and ryegrass in some pastures is certainly due to this cause. Last autumn I examined a pasture white with bents, every one being the dry fruiting stalks of crested dogstail. The pasture was well stocked with sheep, whose food was represented by the short turf beneath the bents. The field was laid down six years ago with a mixture of seeds which contained one-eighth of a pound of dogstail to the acre. The persistent rejection of this grass and the annual ripening and self-sowing of its seeds have caused its extraordinary increase. An incautious observer would now, as has often been the case in the past, carry away the impression that whatever good was in the pasture was due to the presence of this predominant grass—the crested dogstail. Indeed, the autumn bents of our pastures, whether they are ryegrass, dogstail, Yorkshire fog, *agrostis*, or *aira*, are, when rightly understood, valuable indications of what to avoid in laying down pastures.

With the view of treating, so far as possible, a portion of each plot as if it were eaten by stock, one half was cut when the plants were coming into flower, and the other half was allowed to seed before being cut. The result of this separate treatment, for the two years, is shown in the Table on page 28.

No testimony is here given, nor could it have yet been expected, as to the influence of the different treatment of the two portions of the plots on the life of the grass. That will show itself only after some years' cultivation.

Weight of the Produce for the Two Years, calculated for an Acre of each Grass cut in Flower or in Seed.

	In Flower	In Seed	Less yield of plants cut in seed
	tons cwt.s. qrs. lbs.	tons cwt.s. qrs. lbs.	per cent.
Italian ryegrass	3 9 3 20	2 7 2 0	47
"Annual" ryegrass	3 12 0 0	2 7 2 24	51
Perennial ryegrass	2 19 2 16	2 11 3 4	14½
Foxtail	3 16 0 8	2 4 3 20	70
Cocksfoot	5 10 0 8	4 1 0 16	35½
Meadow fescue	3 18 3 18	3 11 1 4	10
Tall fescue	5 9 0 24	3 19 3 12	33½
Timothy	3 10 0 16	3 3 0 0	15

The different weights of produce in the two halves deserve some consideration, though caution must be exercised in comparing the weights. The produce was all weighed green. This necessarily gave an advantage to the plants cut in flower, which abound in water that is lost to the plant which has ripened its seed. A certain proportion of the greater weight of the portions cut in flower is due to the aftermath; while the plants that had ripened their seed, having done their year's work and exhausted themselves, produced scarcely any aftermath. The early-cut foxtail was ready for mowing this year on May 28, and was cut the second time on July 31; while in the heavy loam of the Warren Field a third growth was cut on September 28. By the end of October the timothy and foxtail had ceased growing, but the cocksfoot, meadow fescue, and tall fescue were still producing fresh foliage.

After making all allowances for adventitious weight that does not increase the nutritive properties of the food, there can be no doubt that there yet remains a valuable surplus which gives a decided advantage to the pasture that is cut during flowering. When the grass begins to flower, the whole plant is most fully charged with nutrient substances. Flowering is a food-consuming process. When the seed is fertilised, the whole of the food temporarily stored throughout the plant is gradually transferred to the growing seed, where it is finally stored for the use of the young plant when it begins its independent life. As soon as the work of lodging the food in the seed is completed, there is left in the leaves and the stalk little besides the cellulose, which forms the substance of the plant, and which is of little use as food. In the work of preparing hay from grasses that have seeded, a large proportion of the seeds are lost, and with them the food required by the stock. It is then most desirable not to allow the plants in a meadow intended for hay

to ripen their seeds; but, instead, to cut the meadow when the food prepared by the plant is still distributed through its tissues, and when it can be preserved without loss for the use of the stock.

The cocksfoot, foxtail, and tall fescue in the Stackyard Field were this autumn very much infected with rust; only a little was to be seen in the plants in the Warren Field. The meadow fescue and timothy in the Stackyard Field were slightly injured, but the ryegrasses were not attacked at all.

The next Table presents a contrast between the bulk yielded in the two fields where the experiments are carried on. As was to be expected, a heavier crop was obtained from the clay loam of the Warren Field than from the sandy loam of the Stackyard Field.

Total Green Produce from the Two Fields for both years (1887-1888)
—calculated for an Acre.

	Stackyard Field	Warren Field
	tons cwt. qrs. lbs.	tons cwt. qrs. lbs.
Italian ryegrass	2 11 1 4	3 6 0 16
"Annual" ryegrass	2 14 0 16	3 5 2 8
Perennial ryegrass	2 9 3 12	3 1 2 8
Foxtail	2 15 1 20	3 5 2 8
Cocksfoot	3 16 2 24	5 14 2 0
Meadow fescue	3 0 0 14	4 10 0 8
Tall fescue	3 9 1 20	5 19 2 16
Timothy	2 6 2 16	4 16 2 0

II. EXPERIMENTS WITH SINGLE GRASSES IN GREAT HILL BOTTOM FIELD.

The northern portion of this field was placed at my disposal for further grass experiments, and, with the approval of the Seeds and Plants Committee, it was divided into plots of one-eighth of an acre, and each plot was sown with a single species of grass, with the view of checking the results obtained from the smaller plots in the Stackyard and Warren Fields, of adding to the species of fodder plants experimented upon, and of making some trials as to the favour in which the different species are held by stock. No manure was applied to any of the plots. The grasses selected for experiment here are:—

Perennial ryegrass, *Lolium perenne*, Linn.

Cocksfoot, *Dactylis glomerata*, Linn.

Meadow fescue, *Festuca pratensis*, Huds.

Tall fescue, *Festuca elatior*, Linn.

Foxtail, *Alopecurus pratensis*, Linn.

Timothy, *Phleum pratense*, Linn.

Rough-stalked meadow-grass, *Poa trivialis*, Linn.

Smooth-stalked meadow-grass, *Poa pratensis*, Linn.

Tall oatgrass, *Avena elatior*, Curtis.
 Brome-grass, *Bromus inermis*, Leyss.
 Fiorin, *Agrostis alba*, var. *stolonifera*, Sm.
 Yarrow, *Achillea Millefolium*, Linn.

The seeds were sown on May 12 and 13, 1888. The two meadow-grasses, foxtail, fiorin, and timothy did not succeed in forming a plant, and they will be re-sown in the spring. The plots were covered throughout the summer with annual weeds, and were mown several times with the view of getting rid of the weeds. In October, five of the plots were fairly free from weeds, and being cut yielded the following green produce:—

	Rate per acre.		
	tons	cwts.	qrs. lbs.
Perennial ryegrass	1	4	2 0
Cocksfoot	1	6	1 12
Meadow fescue	0	18	2 0
Tall fescue	0	18	2 8
Tall oat-grass	0	18	0 16

These results are recorded, but the experiment can scarcely yet be said to be begun.

III. PERMANENT PASTURE, WITH AND WITHOUT RYEGRASS, IN GREAT HILL BOTTOM FIELD.

These experiments were instituted with the view of determining the relative worth of different quantities of the same seed in laying down pasture, and the value of ryegrass when employed with the other grasses. Three plots, an acre each in size, were sown with grass-mixtures without ryegrass, and three plots of half an acre each with grass-mixtures containing ryegrass. The same number of seeds were sown on each double plot, a certain quantity of the larger seeds being replaced in the half-acre plot by a corresponding number of ryegrass seeds. In 1886, the seeds were sown at the rate of 20,000,000, of 16,000,000, and of 11,500,000 to the acre. The heaviest-seeded acre and a half was sown with oats, but completely failed, and the portion was ploughed up, and re-sown with the same number of seeds without oats, but again failed. The produce of the seeds in the other two plots having shown that so large a number of seeds as 20,000,000 were not required to obtain a heavy crop, it was resolved to try a smaller number of seeds than had hitherto been used. The acre and a half were accordingly divided, and one half was laid down in May 1888 with 16,000,000 seeds, and the other with 8,000,000, no ryegrass being used. The results of the season's growth are given, though no deductions can as yet be drawn from them. The next two years will show whether, by tillering, the smaller number of plants will more rapidly increase, and overtake the more heavily seeded plot.

*Experiment with Thick and Thin Sowing: Seeds sown on the
Three-quarter Acre Plots.*

	Quantity per acre	Number of ger- minating seeds per acre	Quantity per acre	Number of germi- nating seeds per acre
	lbs.		lbs.	
Foxtail	1	414,499	2	828,998
Cocksfoot	3	1,407,399	6	2,814,798
Meadow fescue	1	288,010	2	576,020
Tall fescue	1	232,320	2	464,640
Timothy	2	2,276,108	4	4,552,216
Rough-stalked meadow-grass	1	2,194,659	2	4,389,318
White clover	1	620,220	2	1,240,440
Alsike	1	652,444	2	1,304,888
Totals	—	8,085,659	—	16,171,318

Results of the First Year, 1888: Three-quarter Acre Plots.

No. of seeds per acre	Cost of seed per acre	Produce of hay per acre	Cost of seed per ton of hay
	£ s. d.	tons cwt. qrs. lbs.	£ s. d.
16,000,000	1 6 0	1 10 0 17	0 17 3
8,000,000	0 13 0	1 0 1 25	0 12 7

The two-acre plots without ryegrass and the two half-acre plots with ryegrass have yielded crops since 1886, when they were sown with the following seeds:—

*Quantities and Prices of Seeds used for thick and thin sowing,
with and without ryegrass.*

	Plot 1				Plot 2			
	(A.) Without ryegrass		(B.) With rye- grass		(A.) Without ryegrass		(B.) With rye- grass	
	Amount sown per acre	Price per acre	Amount sown per acre	Price per acre	Amount sown per acre	Price per acre	Amount sown per acre	Price per acre
	lbs.	s. d.	lbs.	s. d.	lbs.	s. d.	lbs.	s. d.
Foxtail	2	3 0	1	1 6	3	4 6	1½	2 3
Cocksfoot	5	5 5	2½	2 8½	6	6 6	3	3 3
Meadow fescue	3	3 6	1½	1 9	4½	5 3	2	2 4
Tall fescue	2	3 0	1	1 6	3	4 6	1½	2 3
Ryegrass ¹	—	—	9	2 3	—	—	12½	3 1½
Timothy ¹	1½	0 7½	6	2 6	1½	0 7½	6	2 6
Rough-stalked meadow-grass	½	0 11	½	0 11	1	1 10	1	1 10
Smooth-stalked meadow-grass	½	0 4½	½	0 4½	1	0 9	1	0 9
White clover	1	1 0	1	1 0	1½	1 6	1½	1 6
Alsike	1	1 0	1	1 0	1½	1 6	1½	1 6
Cowgrass	2	2 0	2	2 0	3	3 0	3	3 0
Totals	—	20 10	—	17 6	—	29 11½	—	24 3½

[Continued on page 33.]

¹ See remarks in first paragraph on page 33. It should be added that the prices also are higher for the plots with ryegrass and lower for those without ryegrass than were intended, 1s. 3d. being added to the one, and 7½d. deducted from the other.—W. C.

Unfortunately the quantities of the timothy seeds were transposed, so that three pounds were included in the mixture for the half-acre plots, and only a pound and a half was put on the acre plots; whereas it was intended to put three pounds on the acre plots, and a pound and a half—that is, at the rate of three pounds per acre—on the half-acre plots. The result is that the timothy is greatly in excess in the ryegrass plots, being at the rate of six pounds per acre as against a pound and a half per acre on the other plots.

The total weight of the seeds sown per acre is not given, this being completely misleading when considered apart from the quantity of each seed used, as the quantity of each seed has been determined by the number of germinating seeds in a pound. The absurdity of sowing so many pounds per acre without regard to the different kinds of seeds will be apparent if we consider that a pound of white clover seed will produce three times as many plants as the same weight of red clover seed, and a pound of rough-stalked meadow-grass seed should give as many plants as five pounds of cocksfoot or seven pounds of meadow fescue.

After the first year, half of each plot has annually been eaten by sheep, and the other has been cut and made into hay. The sheep were supplied with decorticated cotton-cake at the rate of 5 cwts. to the acre, and the portion hayed was manured with the same quantity of decorticated cotton-cake. The sheep went over the plots three times in the year. During 1888, 80 sheep were put on from May 10 to May 21, 78 from June 5 to June 18, and 57 from July 19 to July 30. After this, a heavy crop of grass was produced; but it was too rank, from the droppings of the sheep, to be again fed, so it was mown on September 27, and made into hay. This crop produced the following weights of hay:—

					Produce of hay per acre.		
					tons	cwts.	qrs. lbs.
1 A.	Without ryegrass	.	.	.	.	0	17 1 24
1 B.	With ryegrass	.	.	.	.	0	18 0 8
2 A.	Without ryegrass	.	.	.	.	1	3 1 4
2 B.	With ryegrass	.	.	.	.	1	6 2 16

It is too soon to generalise on the results here tabulated; but it may be pointed out that the seasonal decrease of the year 1888 affected in a larger ratio the plots containing the ryegrass.

III.—*Report on the Farm Prize Competition in Nottinghamshire, Lincolnshire, and part of Derbyshire and Leicestershire in 1888; Classes 2 and 3.* By THOMAS STIRTON.

Judges.

HENRY CAMPION, Bletsoe Castle, Bedford.

JOHN J. HARLE, Whitfield, Falfeld R.S.O., Gloucester.

THOMAS STIRTON, West Stratton, Micheldever, Hants.

IN continuation of the Report on Class 1, which appeared in the Journal for October 1888, it is now my duty, on behalf of myself and colleagues, to report on the remaining two classes of farms for which prizes were offered in connection with the Nottingham Meeting of the Royal Agricultural Society. These were :—

CLASS 2.—For the best-managed arable and grass farm above 100 acres and not exceeding 300 acres, of which not less than one-half shall be arable. First prize, 50 guineas; second, 25 guineas.

CLASS 3.—For the best-managed arable and grass farm above 25 acres and not exceeding 100 acres. First prize, 50 guineas; second, 25 guineas.

The competition was limited, as usual in such cases, to tenant-farmers paying a *bonâ fide* rent for at least three-fourths of the land in their occupation, and no competitor was allowed to enter more than one farm. In the event, however, of his having other holdings, the Judges had instructions to inspect them if they thought desirable.

The two classes submitted for the inspection of the Judges in this division included twenty farms, and extended over a very wide area, reaching from the neighbourhood of Brigg in North Lincolnshire to the borders of Cambridgeshire, and comprising many varieties of soil and great diversity of cultivation. The first inspection began on Tuesday, December 13, and was concluded on the 23rd of that month, during which period all the three Judges went carefully over every farm, visiting almost every field, except on one farm, where they were prevented by snow from seeing the land. The second inspection was made by the reporting Judge alone, and this visit was begun on May 14. The third and last inspection, in which all the Judges again took part, was begun on June 28. As a preliminary step, an elaborate series of printed questions was issued to each competitor, the replies to which, being in many cases very detailed, furnished a useful guide to the Judges in visiting the farms. In Class 3 the inspection became very interesting, as the competition (especially between Messrs. Baguley, Widdowson, and Milner) was extremely close.

The Judges desire to state that, of the twenty farms submitted for inspection, at least ten were worked in conjunction with other holdings, several of which were visited. This entailed additional labour on the Judges, and was otherwise unsatisfactory, as it was not always easy to ascertain how far the stock owned by the occupier really belonged to the competing farm. They consider that it would be preferable to require each competitor to enter all the land which he occupies.

The Judges have pleasure in stating that on all the farms entered for competition the farming was of a very high and meritorious description. This was doubtless in a great measure owing to the direct personal supervision and attention given to all details of farm management. It was very gratifying in these gloomy days of agricultural depression, when much is still heard of unprofitable farming, to find, even on land of not very high quality, farmers who are able to make their business pay. It was pleasant for the Judges, and especially for the writer of this report, who had not previously a very high opinion of farming on small holdings, to recognise the fact that these small farms can hold their own when managed by practical men. Some of these men have risen from very humble positions by their own industry and perseverance, and, having succeeded in saving and investing money, will no doubt some day be in a position to take larger farms. Cottages on all the estates that came under the inspection of the Judges were very commodious and convenient, and well adapted to the circumstances.

The general system of farming in Lincolnshire and Nottinghamshire was so fully described in the report on Class 1 that any further particulars regarding those counties are quite unnecessary.¹ As, however, a Commended farm in Class 2 and a Highly Commended farm in Class 3 were situated in Derbyshire, some reference to the agriculture of that county may be desirable. Regarding Derbyshire, indeed, a report appeared in Vol. XVII. of the Journal (1881); but in these days of rapid transition a great deal happens in seven years, and, in connection with the farm competition in the east of the county, some details are now submitted, chiefly by way of supplement to reports previously published.

¹ It was mentioned in the report on Class 1 (Vol. XXIV. page 528), that the Judges had observed a very unusually large proportion of stubble land annually sown to white or soft turnips, to the great neglect of the undoubtedly far more valuable swede turnips and other roots. It is worth mention, therefore, that in the districts visited by the Judges in Classes 2 and 3 there was a very large preponderance of swedes.

The General System of Farming in Derbyshire.

Distribution and Occupancy of Land.—The total area of land occupied in Derbyshire, exclusive of nursery-grounds, woods, heath, and mountain, was on June 1, 1888, 511,541 acres. Of this, 462,023 acres were rented, and 49,518 acres, or about one-ninth, were occupied by the owners. From the returns of owners of land ordered by the House of Commons in 1874, it appears that one landlord in Derbyshire owns 83,829 acres, another 27,000, and a third about 13,000. These three estates comprise about one-fifth of the area, but only one-thirteenth of the rental of the county. There are 12 landowners with estates of 5,000 to 10,000 acres, 35 with 2,000 to 5,000 acres, 41 with 1,000 to 2,000 acres, 73 with 500 to 1,000 acres, 510 with 100 to 500 acres, 563 with 50 to 100 acres, 2,188 with 20 to 50 acres, 3,472 with 1 to 10 acres, and 12,874 with less than 1 acre of land.

In the Agricultural Returns for 1880, the number and acreage of farms, according to size, in that year were given as follows:—

—	Fifty acres and under	Fifty to 100 acres	One hundred to 300 acres	From 300 to 500 acres	From 500 to 1,000 acres	Above 1,000 acres
Number of Farms .	10,058	1,503	1,319	122	17	1
Acreage of Farms .	133,944	108,731	213,436	44,857	10,459	1,406

A conspicuous feature in this Table is the very large proportion of farms under 300 and even under 50 acres, which latter are fully three times the number of all other holdings. These small occupancies are chiefly in the northern portion of the county, and are numerous on some of the large estates. In his report to the Royal Commission on Agriculture in 1881, Mr. Druce states that, of 306 holdings on the Duke of Devonshire's estate in the Buxton locality, about 125 are under 20 acres, other 70 are from 20 to 50 acres, 42 from 50 to 100 acres, and only 69 above that figure. On the Duke of Rutland's estate there are 426 farms—of which 250 are under 20 acres, 80 from 20 to 50 acres, 50 from 50 to 100 acres, 46 of 100 acres or upwards—but only one of these above 500 acres.

The following Table shows the proportional acreage of each class of holdings in Derbyshire and in the whole of England in the year 1880:—

Percentage for Derbyshire	Class of Holdings.	Percentage for all England
26	Fifty acres and under	14
21	From 50 acres to 100 acres	13
42	" 100 " 300 "	41
9	" 300 " 500 "	18
2	" 500 " 1,000 "	11
	Over 1,000	3

Many small occupancies on the Duke of Devonshire's Buxton estate consist simply of a cottage, with two or three acres of land, almost wholly old grass. The men work in the limestone quarries, whilst their wives and families do most of the farm-work during the day. No horses are kept, and the tenants sometimes arrange with larger farmers to summer their cows, in which case the land is all mown for hay. No part of this land is less than 1,000 feet above the sea-level. Rents are from 1*l.* to 1*l.* 5*s.* per acre, including the cottage, and the money is punctually paid. The people are believed to be very comfortable. The making of butter is the almost exclusive industry on these farms, but it is not always of very good quality. The sale of milk to the towns is left to the larger tenants. One great difficulty in connection with small holdings is the outlay on buildings, and if interest were charged on these the rent would be considerably increased.

As a general rule, occupiers of small holdings work very hard, live economically, and deprive themselves of many comforts in order to pay the rent and lay by some money. They cannot afford to keep either horse or implements, but depend on neighbouring farmers, or "higglers," to do the work. Still, they are a thrifty, well-doing class, seldom in arrears with the rent, and generally move to larger holdings. Some of the very small holders assist on larger farms in busy times. In social position, these tenants are not much removed from farm-labourers, but ideas of self-respect are promoted by the occupation of land, and they have passed successfully through the period of agricultural depression. Few farms of this class have remained unlet;¹ rents have been well paid, and for any small holdings that became vacant there has always been ready competition. Not much change has recently occurred in the character of farms belonging to the chief landowners of the county, but the tendency has been rather to increase the size of the holdings than the number of the tenants.

In June 1886 there were 4,053 garden allotments (excepting

¹ In the return of unoccupied farms included in the Agricultural Returns for 1887, six farms, comprising altogether only 120 acres, were returned as unoccupied in Derbyshire.

railway allotments), of and exceeding $\frac{1}{8}$ of an acre in extent, attached to cottages held by labourers and working men, at an average rent of 5*l.* 3*s.* 7*d.*, including the cottage. Of these allotments, 985 were held by a weekly tenure, 469 monthly, 1,332 quarterly or half yearly, 1,212 yearly, and 55 under other conditions. Allotments for labourers are more numerous in the south than in the north of the county, which is not an arable district, and not many labourers are required. Many of these cottagers keep pigs and poultry, and, in the northern part of the county, cows also. Labourers who live in the villages surrounding the park at Chatsworth are allowed to pasture their cows in the park during summer for 21 weeks, from May till October, at a charge of 3*l.* per cow, and the privilege is much appreciated. Some cottagers thus keep one cow, others two, others three or four. These cow-owners, as a rule, make butter, or combine and send the milk to Manchester or other towns in the North. In some cases a co-operative arrangement of butter-making is adopted, several cow-owners combining and taking it in turn to make the butter from the milk of all—each of them, however, being allowed to retain milk sufficient for the family wants. Owing to the number of tourists and visitors, there is always a ready market for good butter in the immediate neighbourhood.

Geology and Soil.—In “The Peak,” as the northern part of the county is designated, there is not much cultivation. The district consists largely of wild heath and mountain land, partly on the limestone, partly on the millstone grit formation. On the Duke of Devonshire’s estate only about one-tenth, and on the Duke of Rutland’s one-twelfth, is arable; the remainder consists of pastoral ranges, with a great extent of moor and forest. Grass-land in the valleys is rich, and the stock generally is very good and suitable to the land; but higher up the hill-sides the land becomes poor, and is bleak and bare on the mountain-summits. In the southern parts of the county soil and agricultural practice differ widely from those in the north. Heavy clay soils alternate with others of a light and gravelly character, chiefly on the red marl formation. In the north-east of the county is a small area of magnesian limestone, which extends from the county boundary some miles westward till it meets the coal series. The soil of this district is of medium quality; some of it being fairly good turnip and barley land.

The coal-measures, commencing a short distance north-east of Derby, extend along the east side of the county, and beyond it into Nottingham and Yorkshire. With this part of the county we are specially concerned at present. The surface-soil

is for the most part dry, and is heavy working land. From Stretton, north to and including Matlock, six miles distant, the surface is hilly. There is friable soil on the hills and in part of the district toward the eastern boundary of the county; but in the valleys it is heavy and stiff, on a clay subsoil. Young plants have there often a hard struggle for existence, and make little progress in spring till the weather becomes genial, and they get hold of the manure in the soil. This is especially apparent in the case of the root-crop, it being difficult to get a plant on such heavy land.

Portions of the land have been greatly improved by draining, and in the neighbourhood of Alfreton heavy crops of Italian rye-grass now wave over land which was previously sour and unproductive. Early ideas with regard to draining have been somewhat modified, and the drains, instead of being put 9 yards apart, are now not more than 6 yards apart, with 2- or 3-inch pipes, 30 inches deep. Three to four inches of stone are first laid over the tiles, a little straw or brushwood above the stones, then clay and soil on the top. Most of the draining had been completed previous to 1880, but where it had not been finished it has been still carried on. During the past two years there has been a revival of improvements on the land, more lime is used, and farmers seem to be awakening from the feeling of despondency that prevailed during the first years of agricultural depression.

Acreage under various descriptions of Crops.—In the Agricultural Returns issued by the Board of Trade, Derbyshire is classed among the 21 pastoral counties—that is, a county in which the acreage under permanent pasture is two-thirds more than the acreage under corn crops. In 1888, there were 404,512 acres in permanent grass for hay or pasture, and for many years there had been a gradual increase. The extent was 391,776 acres in 1881; but in the fourteen years beginning with 1867 there had been a total addition of 67,000 acres to the permanent pasture of the county (Journal, Vol. XVII. [1881], p. 460). In the six years ending with June 1887 there had been a further addition of 13,733, making a total of 80,733 acres in 20 years; but the limit of extension seems to have been reached in 1886, as a reduction of 1,705 acres was indicated in the year following; and again in 1888 there was a reduction of 997 acres.

A feature in connection with grain-crops has been a continuous contraction of the area under wheat, and an extension of that under oats. In 1888, the total acreage under all kinds of crops, bare fallow, and grass, was 511,541 acres, compared with 512,336 in 1881, a change of only 793 acres in six years. The

wheat area, which had diminished previous to 1881, and was then 22,537 acres, has become still more circumscribed, and in 1887 there were only 16,787 acres, though there was a rise to 20,207 in the year following. The cultivation of oats had extended previous to 1881, when the crop covered 26,927 acres; in 1887 there were 28,794 acres, showing another, though not a large, increase; but in 1888 there was a decrease of 1,393 acres. Of barley, beans, and peas there has been a large reduction.

Green crops covered 21,829 acres in 1887—an increase of 865 since 1881, but 2,739 less than in 1871; in 1888, there was a decrease of 160 acres. Turnips and swedes have increased since 1871; mangold shows little change; but there is a decrease in potatoes, cabbage, kohl rabi, and rape, and likewise in vetches.

Some land in recent years has been laid down in permanent pasture; not much, if any, is laid down without a grain-crop. The course usually adopted is to have the land well drained where necessary, to clean it thoroughly, manure it well, and then sow the seeds with wheat or barley, the grain-crop not too thick. Grass-seeds are usually bought from well-known seed establishments, and farmers, as a rule, now leave it in a great measure to the various seedsmen to select suitable grasses for their soils.

Ensilage has, during the past three years, attracted some attention; but comparatively few farmers in Derbyshire believe there is any profit derived from making it, except in very wet seasons, and it has been hitherto made chiefly, if not exclusively, by the landlords. The various modes of making ensilage are watched with interest by the tenants. The Agricultural Returns would appear to indicate that the making of ensilage is decreasing. In 1887 the number of silos in Derbyshire was 65, with an average capacity of 2,771 cubic feet; in 1888 they numbered only 60, with 2,811 cubic feet average capacity. The number of persons proposing to make ensilage in stacks was returned as 40 in 1887, but only 30 in the year following. It is scarcely needful to point out that the apparent decrease in the making of ensilage during 1888 is illusory. It is notorious that the number of silage stacks made during the past summer in all parts of the country was, owing to the difficulty of saving the hay crop, very considerably larger than in any previous year. There is no doubt that this general tendency was apparent in Derbyshire as well as in other counties. The reason, of course, why this increased silage-making is not shown in the Agricultural Returns is that the statistics are collected at the beginning of June, at which date comparatively few

“proposed to make ensilage in stacks” of those who were soon afterwards driven, by stress of weather, to do so.

Live-Stock.—About 1881 there was a great diminution of live-stock, especially of *sheep*. It was stated in the *Journal* that in 1867 there were 258,000 sheep; in 1871 they had fallen to 230,000; and in 1881 they numbered only 191,243—thus indicating a decrease of 67,000 in 14 years. It must be noted, however, that the decrease was not continuous. From 1867 to 1871 the numbers diminished; but in 1875 the total was 261,523—a number exceeding that of 1871, and even that of 1867. An inclement year or two makes a great difference. For example, there were 228,445 sheep in 1880, but within a year the flocks had been reduced by 37,202. No doubt the diminution has been occasioned very largely by unfavourable seasons. The loss of sheep on the heavy clay soils and on the hills was regarded as the greatest calamity ever suffered by the farmers of Derbyshire. Many of those who formerly kept large flocks have now very few sheep, and some of them none at all. In certain instances, undoubtedly, farmers have been compelled to sell sheep to meet current expenses, and have not been able to replace them. The loss was very severe in the winter of 1887-88; but the lowest depth was reached in 1882, when sheep numbered only 170,559, or 87,441 below the level of 1867, and 90,964 below the grand total of 1875. In 1887 they mustered 199,146—a recovery of 28,787 in five years; but the tale of variation must be summed up in the statement that in 1888 the number was only 188,214—a fall of 10,930 from the previous year. Of these, 6,738 were less than one year old. The rigour of the winter of 1887-88, which was exceptionally prolonged and severe, even for the bleak district of “The Peak,” was the cause of serious loss to flockmasters. This coming as the culmination of a series of seasons characterised by their hardship and inclemency was a heavy blow to many of the Derbyshire farmers.

In connection with the decrease of sheep, however, it may be observed that a much larger number than formerly are now killed at an early age; and, practically, the number of sheep in any county is diminished by the number of wethers previously, but not now, kept over one year. It seems that farmers in the Midlands have come to consider it profitable to cross their ewes with black-faced rams, and this practice had been adopted on all the competing farms, with only four exceptions. It appears to be recognised as a fact that black-faced sheep are more saleable than the white breeds, and probably come more early to maturity.

Cattle decreased by 9,177 in the unfavourable years from

1875 till 1881; but in the latter year they numbered 133,481—an increase of fully 11,000 on the total of ten years previously. In 1887 there were 144,529, shewing a similar increase in the shorter period of six years, and a larger number of cattle than at any preceding period. It is a circumstance not easily explicable that in 1888 the number was only 134,704—a reduction of 9,825—of which 3,663 were cows and heifers in milk or in calf, 2,088 other cattle of two years old and above, and 4,074 under two years old.

Pigs have also decreased in number. They numbered 47,000 in 1867; in 1871 they were 40,000; in 1875 they had fallen to 37,271; in 1881, they were 30,000, but seven years afterwards they had risen to 34,371. They are now regarded as a good paying kind of stock.

Horses have not varied much in number, but increased attention has been recently devoted to the breeding of Shire horses. This is, in fact, one of the most hopeful features of Derbyshire farming in the present day. Some of the best Shire horses are reared in the county; and many of the farmers have gone into the business with spirit, and are well maintaining the reputation of the district in this respect. It is not necessary to dwell upon the improvement in the character of heavy horses, which has happily been a redeeming feature amid the general gloom of the past decade. It is sufficiently exemplified not only by the increased importance and success of the annual exhibition devoted to the exclusive interest of Shire-bred horses, but also in the classes provided for them year after year at the Meetings of the Royal Agricultural Society. The demand—a continuous and increasing one—from foreign buyers for the best of the British heavy horses is a steady stimulus to breeders, and this too has been supplemented by a general tendency among home farmers to keep a better class of farm horses than heretofore. The Derbyshire men have wisely seen the possibilities of horse-breeding as a profitable branch of farming. Nor have they confined their attention only to heavy horses: encouraged by the vigorous and enlightened policy of the Royal Agricultural Society and the Royal Commission on Horse-breeding, and assisted by the provision of sound thoroughbred sires at a reasonable fee, they are taking up the rearing of light horses with equal enterprise and zeal.

Another branch of thrifty farming, unnoticed, and probably undeveloped, in 1881, is the breeding of good *poultry*. Until quite recent years the greater number of Derbyshire farmers had only a few mongrel barn-door fowls, that were left very much to live at random. Now the various pure breeds, includ-

ing ducks and turkeys, are to be seen in many farmyards. Neither the farmers of Derbyshire nor of any other county are yet equal to the French peasant proprietors in the economical management of poultry, or in recognising the best kinds for producing eggs and for use at the table. This is, no doubt, a source of profit hitherto too much neglected in all districts, but which may in the future yield very material results.

For twelve years previous to 1881 a revolution in the milk traffic of the county had been gradually taking place. *Cheese-making*, which had long been a conspicuous industry, had greatly diminished, and had been to a large extent transferred from the hands of private families to factories of a more or less public character. Derbyshire was the first county in England to adopt the factory system of cheese-making, which had been previously tried in America and some parts of the Continent of Europe. The new system originated with a meeting of landlords and tenant-farmers, members of the Derbyshire Agricultural Society, held in 1869, at which a committee was appointed, and a guarantee fund formed, with a view to establish one or more cheese-factories. One was erected at Derby, and another at Langford, on the estate of the Hon. Edward Coke. Factories were then gradually established in other districts. In 1881 there were 12 in the county, and some have been added since that time. Among those lately built is one by Lord Macclesfield, in the vicinity of Croydon Abbey, at which the milk of 300 to 400 cows is made into cheese. Another factory intended to turn out all kinds of dairy produce has been erected near Ogston Hall, Higham, by Mr. Turbutt, on whose estate Mr. Arthur Milner's highly commended farm is situated. Milk is bought by weight, not by measure, and the cream is at once removed by a Laval separator. The separated milk at this factory is sold in cans to dealers, or retailed by their own carts along with the new in the towns and villages in the district. The price paid for the skim milk is usually about one penny per quart. At certain seasons of the year the supply is more than the demand, and it is then utilised in rearing calves and pigs. Consignments of butter and dairy produce are sent to many parts of England and to London hospitals. The cream is placed in a patent churn, by which 64 lbs. of butter can be made at once, and the butter is sold fresh every day. One of Cluett's first-prize improved cheese-making vats has likewise been procured, so that cheese as well as butter can be manufactured on the establishment.

Cheese-factories have not been always successful from a financial point of view; nor does their produce, as a rule, equal

in quality that of the best-managed private dairies. Some have been let to private cheese-makers, who purchase milk from farmers in the neighbourhood and make it into cheese, paying farmers for the milk and selling the manufactured article, just as is done by ordinary manufacturers who buy the raw material and sell the manufactured goods. Nevertheless, it is certain that the factory system has extended during the past few years. Whether this is altogether a matter for congratulation is questionable. To the farmer's household, indeed, there is a vast saving of labour and responsibility; but on holdings of a moderate size, where the capital invested is not large, it is almost a necessity that every member of the household should assist in making, as well as in economising, money, and young as well as older people could not be more usefully employed than in jointly assisting with the dairy and collateral occupations.

Unprejudiced observers admit that the factory system has done, and is doing, great and lasting good to Derbyshire farmers. It has broken up the monopoly formerly enjoyed by the old cheese-factors, has shown the farmer the value of his milk, has enabled farmers generally to realise larger incomes, and has delivered them from the vicious system of getting money in advance from cheese-factors, with the inevitable result of being compelled to accept any price that might be offered when the day of settlement arrived. With a factory in his neighbourhood the farmer obtains a sure and ready market for his milk, without any trouble or expense. In some cases the factory is only a depot for the supply of milk to dealers, who make cheese of the surplus; while others make cheese during five or six months in the year, and are closed for the remainder of the time. In close times farmers who contribute milk to these factories dispose of their commodity by private arrangement.

The *sale of milk* has increased enormously. In 1872 the quantity that passed over the Midland Railway, chiefly to London, was 940,000 gallons. In 1880 it was estimated by the railway officials at $5\frac{1}{2}$ millions of gallons. I am indebted to the General Manager of the Midland Railway for the information that during the twelve months ending October 1888 there were 8,393,292 gallons passed over the Midland Railway from Derbyshire. It is conveyed by slow and fast trains, and where necessary, and the traffic is of sufficient magnitude, special trains are provided for the carriage of milk. The freightage is $\frac{1}{2}d.$ per imperial gallon for distances not exceeding 20 miles, $1d.$ per 100 miles or less, and $1\frac{1}{2}d.$ for any distance above 150 miles. From the north and east parts of Derbyshire less milk is sent to London than to factories or to such towns as Manchester and

Sheffield. Within the county milk is taken to the towns and villages for sale once or twice a day to a much greater extent than it was a few years since, and this has been brought about by the lower prices offered at the factories. The price paid a few years since was 7*d.*: now it is 5*d.* or 5½*d.* per gallon in summer. For this reason there is a greater disposition where possible to sell milk by retail in towns, where it realises 8*d.* to 10*d.* The price of 5*d.* per gallon paid by factory-owners is not regarded as remunerative by the farmer, who is consequently induced to look out for a better market, and to take more trouble to supply it. On the other hand, cheese-makers cannot have a great margin of profit, even with milk at 5*d.*, when cheese at the factories sells at 50*s.* per cwt., and a good deal is sold at a still lower rate. Even for the finest quality of cheese the top factory price was lately no more than 52*s.* 6*d.*

An abundant supply of good milk in towns and cities must be regarded as a great benefit; and the sale of milk has not nearly reached its limit of expansion. In the carriage and distribution of milk, numberless improvements have been suggested by experience, one of which is the destruction of the animal odour and heat by refrigeration. With enormous benefit alike to producer and consumer, the traffic may be still indefinitely extended. In London, with its four millions of people, the consuming power is practically unlimited, but it is capricious. On a Saturday or a Sunday, when working people are generally at home to breakfast, and similarly on a holiday or on a hot day in summer, when ices are in demand at every street-corner, any quantity of milk can be sold. To meet such contingencies a wholesale dealer in the metropolis will secure a factory situated conveniently near a railway station, whence he can order an extra quantity by telegraph. These special demands can be met by the factory by merely reducing the quantity of cheese made on that day.

Rents.—There does not appear to have been any general reduction of rents in the county. Remissions of ten to twenty per cent. have been made by some of the large landowners; and in some instances the remission has been much larger, even as much as fifty per cent. by small landowners. These remissions, however, have not been constant or uniform, and in some instances have been intermittent.

On some large estates, such as those of the Duke of Rutland and Sir V. Crewe, rents have seldom been raised to old tenants or their families. On the Duke of Devonshire's estate, on the other hand, there have been valuations at intervals of about twenty-one years, and in the prosperous times rents were

raised. As a consequence there have been very substantial remissions, with large grants of manure and lime in recent years. Small owners, on whose estates rents are generally higher, have been compelled to make very considerable reductions, and a good many farms have changed hands. Instances (which unfortunately are not confined to Derbyshire) are mentioned in which a reduction has been refused to an old tenant, while a rent even below his offer had to be accepted from a new-comer. On an average, rents are about 1*l.* 5*s.* on holdings of 100 acres or thereabouts, about 15*s.* on large holdings, and 30*s.* to 40*s.* (according to situation and quality of land) for farms of 20 to 40 acres.

Wages paid to labourers in the county are high, but the labour bill of farmers is not excessive, owing to the style of farming, especially in the north. Irish agricultural labourers come into the county for the hay harvest and the hoeing of turnips. They are housed and fed in the farmhouse, and get 10*s.* per week or thereabouts, and usually remain in the district until they are attracted farther south by the beginning of harvest. In the southern district of the county wages are high, but the number of labourers on each farm is not large. On one farm of 160 acres the work was all done by three men and a boy. Frequently the men are boarded in the farmhouse, and get about 7*s.* to 10*s.* weekly, with board. In the south-west of the county one or two young men are boarded in most of the farmhouses, and get 18*l.* to 20*l.* yearly. Labourers boarded in the house are engaged by the year; those not boarded in the house by the week. Hours of labour generally are from 5 A.M. to 5 or 6 P.M., or "from morning milking to evening milking." All the milking is done by the farmer, or by his labourers; and it is an essential qualification of a labourer that he should be able to milk. Neither women nor children are much employed in farm-labour in the county. In most districts there are co-operative societies to which the labourers belong, and which are managed by themselves. Registered friendly societies and sick clubs likewise prevail, to which the labourers subscribe.

As a summary of the preceding remarks it may be said that the changes in Derbyshire farming since 1881 consist mainly in less home-made cheese; more cheese and butter factories; increased sale of milk; more attention to the breeding of cattle and horses, and to poultry-keeping; and the introduction of ensilage.

SCHEDULE OF FARMS ENTERED FOR COMPETITION IN CLASSES 2 AND 3.

No.	Name of Competitor	Address of Competitor	Name of Landlord	Extent of Farm		Soil	Subsoil	Tenancy	Remarks
				Arable	Pasture				
Class 2.—Arable and Grass Farms.									
1	Amery, Thomas A.	Norwell, Newark, Notts	Ecclesiastical Commissioners	92	48	140	Heavy Clay	Yearly	Commended
2	Bealby, Benjamin	Carr Banks Farm, Farnsfield, Notts	L. M. Parkinson, Esq.	227	19	246	Gravel	Yearly	
3	Bower, Thomas W.	Oscroft, Bolsover, Chesterfield	His Grace the Duke of Devonshire	127	60	187	Light and heavy	Yearly	Commended
4	Cave, William	Boston, Market Deeping, Lincolnshire	Lord Kesteven	246	21	267	Gravel rock and peat	Yearly	
5	Duckering, C. E.	Cliff Farm, Kirton Lindsey, Grigg	S. B. Skipworth, Esq.	164	9	173	Light Limestone	Yearly	Commended
6	Hanson, R. S.	Newdigate House, Kimberley	Earl Cowper, K.G.	136	19	165	Limestone	Yearly	
7	Hollely, Thomas	Houghton Park, Ollerton, Newark	His Grace the Duke of Newcastle	115	58	173	Gravel	Yearly	Commended
8	Potter, Henry	Bestwood Park, Arnold, Notts	His Grace the Duke of St. Albans	161	66	227	Gravel	Yearly	
9	Simpson, J. W.	Babington Springs, Marnham, Newark	Ernest R. C. Cust, Esq.	97	131	228	Heavy loam	Yearly	Commended
10	Thomson, John	Wilson Hall, Melbourne, Derby	Right Hon. Lord Donington	70	31	101	Clay	Yearly	
11	Wadsley, W. E.	Dunsby, Bourne, Lincolnshire	Governors of the Charterhouse	180	118	298	Gravel and clay	Lease of 12 years	1st Prize
Class 3.—Arable and Grass Farms.									
1	Baguley, John	East Bridgeford, Radcliffe, Bingham, Notts	President and Scholars of Magdalen College, Oxford	51	19	70	Light	Yearly	2nd Prize equal
2	Kilham, H. A.	Tydd St. Mary, Wisbech	Exors. of the late Mr. Kilham, now in Chancery	46	10	56	Light and sandy	Yearly	
3	Milner, sen., Arthur	Stretton, Alfreton, Derbyshire	William Gladwin Turbutt, Esq., J.P.	40	47	87	Chiefly heavy	Yearly	Highly Commended
4	Milner, jun., Arthur	Stretton, Alfreton, Derbyshire	William Gladwin Turbutt, Esq., J.P.	33	40	73	Gritstone, ratchell, and clay	Yearly	
5	Morris, Henry	Saxelby, Melton Mowbray	Mrs. Newcome	26	31	57	Mostly gravel	Yearly	Highly Commended
6	Pogson and Johnson	Beckingham, Newark, Notts	Trustees of the late C. P. Milnes, Esq., now in Chancery	32	33	65	Clay	Yearly	
7	Shelton, R.	Grange Farm, Ruddington, Notts	Joseph Paget, Esq., J.P.	53	32	85	Various	Yearly	1st Prize
8	Webster, John	Shirland Lodge Farm, Alfreton, Derby	James R. Eastwood, Esq.	20	46	66	Ratchell, yellow clay	Yearly	
9	Widdowson, James	Hucknall Torkard, Notts	His Grace the Duke of Portland	54	22	76	Limestone	Yearly	2nd Prize equal

THE COMPETITION.

The schedule on page 47 contains particulars of the holdings in each of the eleven farms entered for competition in Class 2, and the nine farms entered in Class 3.

CLASS 2.—FIRST PRIZE.

White House Farm, Dunsby, Bourne, Lincolnshire, occupied by Mr. William Edward Wadsley.

This farm was first visited by the Judges on December 17, 1887, and the whole aspect of the place, even at that dead season of the year, manifested careful and prudent management. It belongs to the Governors of the Charterhouse, London, who own the village of Dunsby, and almost the whole parish, 2,500 acres in extent. The area of this farm is 298 acres, of which 180 are arable, and 118 are in pasture. Of the arable land, 140 acres are fen, the remainder being high land. The farm is held under a lease of 12 years, at a rent of 562*l.*, including one cottage; but during the past three years a reduction of 168*l.* has been allowed. There is no tithe, but the taxes amount to 64*l.* a year, besides 62*l.* for a drainage rate, such as is commonly levied in the fen districts. For rent and taxes the amount actually paid is 520*l.* per annum. Mr. Wadsley has been tenant for seven years, and succeeded his father, who had occupied the same farm during the preceding 42 years. The farm is under the Agricultural Holdings Act, but the sale of hay and straw is prohibited.

The fen portion lies on the Oxford clay, which in that locality is particularly close, compact, and heavy. At Bourne, five miles distant, there is a well 99 feet deep, where 15 feet of clay and sand may be seen, resting on the limestone rock. On the fen portion of Mr. Wadsley's farm the soil is black loam, very deep and rich, with a stiff subsoil, very good for wheat and beans, and really excellent land, but decidedly unworkable in extremes of dry or wet weather. The high land of the farm is red loam, on a gravelly subsoil, well adapted for barley and turnips. The climate is favourable, and the average yearly rainfall does not exceed 24 inches. Dunsby is a village with about 200 inhabitants, five miles from Bourne, a quiet town, with a population of 4,000.

The farmhouse is a three-storey building, facing southward, on the road leading towards Spalding, and very pleasantly situated. There is a nice flower-garden in front, adjoining which is a kitchen-garden of rather small dimensions. Near the house are the farm-buildings, situated at the very extremity of the

farm. This arrangement is unfortunate, but in other respects the buildings are very convenient, quite sufficient for the requirements, and are kept in good repair by the tenant. In form, they are nearly a square, and are compactly arranged. The yards are divided by a post and rail fence into five compartments, each with a small shed, in which the cattle may find shelter. Accommodation is provided for wintering from forty to fifty cattle. In a central position, with a granary over it, is the stable for working horses, rather old-fashioned, and with no provision for ventilation. The nag stable contains two stalls, and has a loose-box at one end, also a good harness-room and coach-house. The straw barns are conveniently situated for access at once to the stackyard and the cattle-sheds.

The implements, purchased new by Mr. Wadsley at a cost of 567*l.*, are modern and in good order. The following may be regarded as a complete list:—

Four waggons, four carts, one fanning cart, five ploughs, one ridging-plough, one drag, one Duckfoot by Ashton, one reaper by Hornsby, one Bentall, otherwise called a Coleman or share drag, three sets of Howard's seed-harrows, one set of joint harrows, one set of chain harrows, three turnip-cutters by Hornsby, one drill by Garrett, three horse-hoes, one Cambridge roller, one flat roller, two dressing-machines, one weighing-machine and weights by Avery, one wheel-barrow, thirty sheep-troughs, ten tumbrils (feeding-troughs), one hay-rack, twenty dozen hurdles, six ladders, a beam-mill, a cake-breaker, two chaff-boxes, a running-barrow, a bushel and a hand-barrow.

Around the buildings are the grass-lands. The arable fields are all on the right side of the road leading towards Spalding, from which they have convenient access, but the nearest of them is about half a mile from the homestead. Still more inconveniently situated is the fen portion of the farm, which is two miles distant from the farm-buildings, with nothing but a yard with a covered shed to accommodate about fifteen cattle in winter. This yard is fenced round with oak slabs eight feet high, and was constructed at a cost of 25*l.* by the tenant. It appeared to the Judges that it would be a great convenience if a cottage with a small barn were erected in this part of the farm, which would tend to obviate the present considerable expenditure for labour in the cartage of corn to be dressed at the homestead.

The fen portion of the farm is drained under the Black Sluice Act, obtained from Parliament in 1846; and, in virtue of the powers therein granted, the land is taxed at the rate of six shillings per acre. During recent rainy seasons, however, the ordinary appliances were found totally insufficient to keep the land in even tolerable order. A centrifugal pump by Marshall

& Co., Gainsborough, was therefore erected to draw the water out of the ditches into the great canal, known as the Forty-foot River. Since that time, the Governors of the Charterhouse have enlarged the pump and engine to fourteen horse-power, and now it empties water into the river at the rate of thirty to forty tons per minute. Any accumulation of water, therefore, is now hardly possible. The Governors have spent in all 2,000*l.* in fen draining, and it is believed there is not now a better drained fen than their estate in the county of Lincoln. Mr. Wadsley himself has expended from 80*l.* to 100*l.* in making drains three feet deep, so that his farm is all thoroughly drained.

As already stated, the first impressions of the Judges on visiting the farm were very favourable. Every feature indicated thorough supervision and careful management. Gates, with oak posts, all found by the tenant, were in perfect order. Gateways, laid with stones, were kept sufficiently hard for any kind of traffic. The hedges round the arable fields were trimmed with conspicuous neatness, and all kept in excellent order. The wide ditches, a prominent feature of the fen lands, had been thoroughly scoured, and no weeds were allowed to grow along the banks. The land is naturally good, and is kept in a high state of cultivation. In December, the stubble fields were clean, with only a little couch occasionally round the ditches. Wheat for the coming year was clean and looked promising. Swedes had been almost a failure in 1887, owing to the excessive drought; but a field of mangold, drilled on the flat, twenty inches apart, had yielded a good weight per acre. That field was so dry when seen by the Judges in December that it could not be ploughed.

On both divisions of the farm the five-course rotation is adopted. The cropping on the fen land consists of (1) mangold and coleseed, (2) oats, (3) wheat, (4) clover, and (5) wheat. On the high land, the succession is, (1) turnips and swedes (2) barley, (3) barley, (4) red clover, and (5) wheat. In a fair average season, the land carries good crops, but a dry summer is undoubtedly most suitable for wheat on the fen land, where very large returns are then obtained. The average yield of the several crops is: wheat $5\frac{1}{2}$ quarters per acre, barley 6, oats 9, beans 5 quarters; mangolds 41, and swedes 24 tons per acre.

In 1888 the cropping consisted of wheat 52 acres, barley 26, oats 26, artificial grasses 32, mangolds 7, swedes 10, coleseed or rape 18, and beans 9 acres. Some details concerning the different crops and their appearance at the time of our last visit will best illustrate Mr. Wadsley's style of farming.

Thirteen acres of Eldred's wheat, white and red mixed, after

oats in the previous year, looked very well, except 3 acres thinned by the wireworm. Nine pecks had been drilled to the acre, and to each acre of land had been applied 3 cwt. of Meggitt's dissolved bones. A field of 13 acres of white chaff red wheat, after red clover, was exceptionally good and strong. It had been drilled with 9 pecks to the acre. The straw was of quite extraordinary length, and only with great difficulty could the Judges walk through the field.

Seven acres of wheat, Webb's Golden Drop, after red clover, drilled at the rate of 7 to 8 pecks per acre, looked remarkably well. The crop was really all that the heart of a farmer could desire or his eye delight to contemplate.

Another field of 9 acres of wheat, red and white mixed, after clover in 1887, was also magnificent, and was unanimously admitted by the Judges to be one of the finest pieces of wheat they had anywhere seen.

A field of Webb's Golden Grain Barley, 7 acres in extent, after wheat in 1887, had been dressed with 3 cwt. of dissolved bones to the acre, and the crop was very good, except that a good deal of coltsfoot and some sow thistles were discernible. This field had been cropped out of its rotation, which accounted for the under-growth of weeds.

Another field of barley, Webb's Chevalier, after barley in 1887, was exceptionally good and clean. The land had been prepared with 12 loads of farmyard manure and 3 cwt. of bones, and the barley had been drilled at the rate of 9 pecks to the acre.

There were 25 acres of Carter's White Challenge Oats, after swedes in the previous year. This oat is one of the earliest in cultivation. The field had been drilled at the rate of 5 bushels to the acre, which the Judges considered rather too thick; nevertheless, the crop looked exceedingly promising. It had been twice horse-hoed, and once hand-hoed.

Two fields of red clover, each 16 acres in extent, were being grazed with ewes and lambs. In one case the clover was an indifferent plant, owing to the very dry summer of 1887; and in a few places patches of couch-grass might be observed—the only specimens, by the way, to be seen anywhere on the farm. The other field was similarly pastured at the time when the writer saw it in May; but the clover plant was very thin, and, previous to the last visit of the Judges, the field had been steam-cultivated twice, at a cost of 12s. per acre. The soil of this field is very stiff, forming part of a tract extending in a northerly direction from Bourne to Lincoln, and such cultivation was the best course to be adopted in the circumstances.

For his seed crop Mr. Wadsley sows nothing but red clover, and, with a view to keep it clear of couch-grass, it is customary to plough a small headland round the clover-fields, making it a dead fallow.

The cultivation of mangold is a conspicuous feature in the management of this farm, and Mr. Wadsley has at various times carried off 16 prizes in competitions open to the United Kingdom for the heaviest weights produced on 2 acres by the aid of Messrs. Proctor & Rylands' manures. The weight of his mangold crop for the last three years has averaged 47 tons per acre. Under this crop we found 7 acres, consisting chiefly of Cox's Yellow Globe, with a small quantity of Suttons'. For growing mangold the land is always very carefully prepared. It is first ploughed deep early in the autumn, then rolled, cultivated, harrowed, and manured with 30 loads of farmyard dung applied during winter. It is then ploughed 7 inches deep, cultivated, flat-rolled, harrowed, rolled, and drilled with 5 cwt. of Proctor & Rylands' Mangold Manure. The seed is drilled on the flat 20 inches wide, at the rate of 14 lbs. to the acre, and the mangolds are thinned out till the plants are 17 inches apart, which gives something like 18,000 plants to the acre. Two acres intended to compete for the prize offered by Messrs. Proctor & Rylands got nothing but 10 cwt. of their special manure.

Mr. Wadsley was awarded in the competition of 1888 the third prize with a weight of 41 tons 16 cwt. There were then 310 tons on the 7 acres. Two years previously the same field is said to have produced the enormous weight of 52 tons 10 cwt. of mangold per acre.

Ten acres of Webb's Imperial Swedes, drilled on the flat, 20 inches apart, showed a very good plant. The soil was prepared with 23 loads of farmyard manure applied during winter, together with 4 cwt. of Proctor & Rylands' Swede manure drilled with the seed.

A field of 18 acres had been prepared for coleseed, which was to be drilled about July 10. This field, which was very heavy land, had been four times ploughed 7 inches deep during winter, and then cultivated. To each acre 15 loads of farmyard manure had been applied.

There were 9 acres of beans, after wheat, drilled on February 13, at the rate of 9 pecks to the acre. The plant was regular all over the field, but was rather short in the straw.

Fourteen acres of grass had been laid down five years previously, with Sharpe's permanent grass mixture, at a cost of 28s. per acre, and 4 cwt. of dissolved bones had been sown on it

in March 1888. Clover was very deficient, and Timothy was the only grass that prevailed to any extent. In the opinion of the Judges this field had not received so much attention as the arable land, though a marked improvement took place after the dissolved bones had been applied.

There were 44 acres of permanent pasture, divided into four fields. Grass-land has been described as "the glory of Lincolnshire," and with pasture as well as cropping Mr. Wadsley has been very successful.

The following Table shows the stock on the farm at the time of our several visits:—

Stock	December 1887	May 1888	June 1888
Horses	15	14	14
Foals	—	2	2
Cattle	41	53	45
Sheep	337	328	323
Lambs	—	240	230
Pigs	7	11	11

The working horses are of a good useful stamp, very active, and capable of doing a good day's work. Two or three foals are reared annually, so as to keep the teams supplied with young and vigorous horses.

The cattle are very useful-looking shorthorns, partly reared on the farm, partly bought in for the purpose of feeding. Those bred on the farm are chiefly of the breed known as the "old red Lincolnshire." On a portion of the grass-land cattle are fed off in summer with the help of a little cake. In winter the system Mr. Wadsley adopts is to chaff oat- and barley-straw, and mix it with clover or hay. To the feeding cattle Mr. Wadsley gives a ration of about 7 lbs. of the best linseed- and cotton-cake in equal proportions, together with 4 lbs. of bran or barley-meal mixed with a bushel of roots. The younger animals are fed in a similar way according to their age. The dairy consists of only three or four cows, so that the quantity of produce sold from this department is not large.

The flock consists of 200 Lincoln ewes, of which two-thirds are put to rams of the same breed, and the remainder to Hampshire rams. The ewes are chiefly wintered on grass; but are supplied with one pound of corn and a stone of roots daily. Wether lambs are usually fed off when about a year old. Formerly Mr. Wadsley was in the habit of keeping them till nearly twice that age, but he finds early maturity most remunerative, and big fat sheep are now almost unsaleable. Indeed, the system of keeping old sheep has almost died out in several

parts of Lincolnshire. Mr. Wadsley prefers pure Lincolns to the cross with Hampshire rams; but, looking at the stock, the Judges would have preferred the latter. The hoggets are wintered on coleseed and swedes, and are fed off on grass during the subsequent spring and summer; when not on coleseed they get turnips, and half a pound of mixed cake with hay or clover.

Pigs are of the large white breed, and are of a good useful character.

The cost of labour is about 25s. per acre. Weekly wages paid in the district are 10s. to 12s. for ordinary labourers, who are fairly plentiful. Some have allotments, but the Act of 1887 has not come into operation in the district. The work on the farm in the winter of 1887 included the carting of 1,000 loads of soil on to the grass-land, which has made a marked improvement.

Mr. Wadsley has no regular system of book-keeping; but the Judges were enabled to ascertain how much was made from stock, corn, and other articles sold, and to discover that there was a fairly good balance on the right side. The year 1887 turned out much better than the two previous years, probably owing to the fact that the dry summer of that year, to which the statistics refer, was very suitable for wheat on such heavy land. In the last three years Mr. Wadsley's expenditure averaged for cattle 160*l.*, sheep 320*l.*, horses 20*l.* 13*s.*, pigs 11*l.* 6*s.* 8*d.*, corn-seeds and feeding-stuffs 318*l.*; labour 366*l.*, artificial manures 34*l.* 13*s.* 4*d.*, and tradesmen's accounts 140*l.* For the same period his receipts were for cattle 422*l.* 13*s.* 4*d.*, sheep 596*l.* 13*s.* 4*d.*, horses 45*l.* 6*s.* 8*d.*, pigs 30*l.* 13*s.* 4*d.*, corn sold 1,027*l.*, dairy produce, including milk, 46*l.* 13*s.* 4*d.*, poultry 25*l.*, and a small sum for sundries.

As a result of careful inspection the Judges were unanimously of opinion that Mr. Wadsley was entitled to great credit in the management of his farm. In respect of productiveness of crops, he was far ahead of his rivals, and was not behind them in the other points submitted for decision. Wheat was exceptionally good, being indeed almost perfect. Spring corn looked equally well; while the root crops were in a state of cleanliness and cultivation which would have done no discredit to a garden. Pasture-land was short of grass, but well grazed, and all hassocks (or tussocks) had been carefully eradicated. Stock of all descriptions was of good quality.

The soil of the farm is undoubtedly of great natural fertility, but the land is heavily cropped, as will appear from the details already submitted, and careful management is required to keep it in such high and clean condition. Certainly Mr. Wadsley takes great

interest in the management of his land. Excellence in any line of life is not to be attained without continued and vigorous effort, and the success of such a tenant deserves to be recognised. The Judges having taken into consideration the conditions imposed by the Society, and especially the first three—viz. general management and profit, productiveness of crops, and quality of stock—were unanimous in awarding to him the First Prize.

Mr. Wadsley recommended for the Society's Certificate of Merit John Hopkins, aged 53 years. He has been 26 years in the service of Mr. Wadsley and his father, and was particularly recommended for excellent ability in thatching, stacking, draining, and hedging. His conduct has been exceptionally good, and he has brought up a numerous family.¹

He recommended also Thomas Green, who has been 36 years on the farm. He is specially meritorious as a shepherd, in which capacity he has gained the premium of the Lincolnshire Society for raising the greatest number of lambs from a given number of ewes.¹

CLASS 2.—SECOND PRIZE.

*Baston Farm, Market Deeping, Lincolnshire, occupied by
Mr. William Cave.*

This farm was first inspected by the Judges on December 17, 1887, and the first glance indicated excellent management in spite of many difficulties. It is a poor farm, but has been well managed by Mr. Cave's father and himself, with most satisfactory results, and it was at once apparent that the farm would take a high place in the competition. It is 267 acres in extent, of which 246 are arable and 21 in grass. The landlord is Lord Kesteven, Casewick Hall, Stamford, and the farm is held by Mr. Cave on a yearly tenancy, at a rent of 430*l.* per annum, including three cottages. There is no tithe, but a drainage rate of 2*s.* per acre is payable by the tenant, the remainder being paid by the landlord. Rates and taxes altogether amount to 75*l.* 11*s.* 8*d.* a year. For the last 18 months a reduction of 15 per cent. of the rent has been allowed. Welcome though this relief is, the system of temporary remissions is not a very satisfactory one to an enterprising tenant, and even with the reduction the rent and taxes amount to nearly 35*s.* per acre.

Baston Farm is not under the Agricultural Holdings Act, and the tenant is not allowed to sell hay, straw, or roots. In case of quitting the farm, he is entitled to half the cake bill of the

¹ Certificates and money gratuities have been granted by the Society to each of these men.—ED.

preceding year, on condition that it does not exceed the average of the three previous years; also half the bill for artificial manures used on the root crop of the current season, but not to exceed 4 cwt. per acre. Allowance is also made for ploughing, herbage, and other tenant-right of a similar kind. The present occupier was born and brought up on the farm. It was occupied 26 years by his father, afterwards managed five years by Mr. Cave for the executors, and for the past four years has been occupied by him on his own account. The farm lies in two parts—the Home Farm, consisting of about 120 acres, and the fen land of 147 acres. On the former, the soil is of a sandy nature, with a gravelly subsoil, very well adapted for barley and root-growing. The fen land consists of a black, peaty soil, over a layer of poor clay, with a rocky bottom, and in some fields the soil resembles decayed wood.

Fen soil differs very greatly in character, the difference arising partly from the presence or absence of clay in conjunction with peat. The soil on Mr. Cave's farm contains little or no clay, and the land is therefore liable to blow. An instance of this was seen by the reporting Judge in May on a piece of oats. Crops, if at all early in spring, suffer greatly from late frosts; and damage caused in this way was noticeable on Mr. Cave's farm, and to a much greater extent on an adjoining farm, where a promising field of oats was cut down in patches all over the field by frosts in May. A sample of Mr. Cave's fen soil was sent to the Society's Consulting Chemist, who kindly analysed it, with the following results:—

Soil dried at 212° F.

¹ Organic matter and loss on heating	43.49
Oxide of iron	4.76
Alumina	5.17
Carbonate of lime	3.09
Sulphate of lime	4.58
Magnesia . . . . .	.63
Potash . . . . .	.36
Soda . . . . .	.23
Phosphoric acid . . . . .	.50
Insoluble silicates and sand	37.19
	<hr/>
	100.00
¹ Containing nitrogen	1.66
Equal to ammonia	2.02
Total lime	3.62

The soil was of a higher quality than might have been expected. Dr. Voelcker states that the soil contains a great deal of vegetable matter, and is at the same time uncommonly well supplied with mineral constituents; the amount of phos-

phoric acid is exceptionally high, and there is also plenty of lime, and a moderate allowance of potash. In consequence of the vegetable matter there is an extremely high proportion of nitrogen in the soil. A further striking feature is the occurrence in considerable amount of selenite or sulphate of lime; sharp little crystals of selenite are scattered throughout the soil, and here and there are congregated into masses.

The drainage of the district is under the Deeping Fen Commissioners, but the main ditches are not considered to be sufficiently deep to drain the land thoroughly. This, however, is shortly to be remedied. A fairly wet winter is suitable for Mr. Cave's fen land, which requires to be solidified; but a dry summer suits best for the wheat crop. Land in this part of the fen has sunk considerably since tillage operations were begun upon it.

Mr. Cave resides at Baston, a very long straggling village. Bourne is the nearest town, but the chief market-towns of the district are Stamford, ten miles, and Spalding, eleven miles distant. The house is old-fashioned and comfortable, stone-built, facing south, and abutting upon the Spalding road. The farm-buildings are in the form of a square, substantially built, very commodious, in good order, and exceedingly well kept by the tenant. In the centre is a large open yard, with sheds for cattle, and around it are grouped five smaller sheds, together with stable, harness-room, chaff-house, waggon and implement sheds. On the north side is a large barn and root-house, contiguous to the stack-yard, at the farther side of which are houses for cows and calves. On Mr. Cave's fen farm there is a small homestead, consisting of yards for cattle, and a stable, with foreman's cottage. These buildings are approached by a private road, half a mile long, leading from the Spalding road, made by Mr. Cave's father and kept up by the present tenant. A little expense in the way of fixing guttering to these buildings would be beneficial for the sake of the manure which is made in the yards.

The Home Farm lies on the left-hand side of the road leading towards Spalding, but is very far from being compact, as it straggles along the roadside to a distance of a mile from the house; the Fen Farm is a mile further on, or two miles from the homestead. This arrangement is very inconvenient, and most prejudicial to economical farm-management. All the more credit is due to the tenant who, in spite of many and great disadvantages, can manage so admirably in all departments, and that not for any special occasion, but regularly from year to year. Not only was the farm satisfactory to the present Judges, but the same holding gained a prize

offered by the Earl of Carysfort several years ago for the best-managed farm in the Stamford district. It has the advantage of a fairly good climate. The rainfall, as measured at the pumping-station in 1887, was $15\frac{1}{2}$ inches, but that was the least that had been observed for 20 years. Some draining has been lately done by the tenant without assistance from the landlord. The drains were cut about 30 to 36 inches deep, the contrary way to the old clay grips, and filled with thorns, with tile outlets through the turfy holes where necessary. This system of draining is not one to be recommended, although it appears in this case to answer very well at present.

On the Home Farm the rotation of crops consists of (1) turnips, (2) barley, (3) swedes, (4) wheat. On the Fen, the rotation is (1) coleseed and turnips, (2) oats, (3) wheat, (4) seeds, and (5) wheat. The mixture for seeds consists of 7 lbs. red clover, 7 lbs. white clover, 2 lbs. trefoil, and 4 lbs. ryegrass. This seems to suit the land admirably, as Mr. Cave had the best field of seeds found by the Judges anywhere during their visits of inspection. On an average, the yield of grain is $4\frac{1}{2}$ quarters wheat, 4 quarters barley, and $7\frac{1}{2}$ quarters oats per acre.

For 1888, the cropping consisted of wheat 69 acres, barley 10, oats 56, sown grass not included in pasture 47, mangold 12, swedes 27, cabbages or kohlrabi 4, vetches or tares 1, coleseed 17, carrots 2, and potatoes 2.

Wheat, chiefly Eldrid's white chaff red, was very clean, and looked fairly promising. In two instances, after seeds, it had received 8 loads of farmyard manure per acre. A field of 24 acres on the Fen, after clover grazed in 1887, showed a regular plant throughout; but a little *Agrostis stolonifera* (fiorin or creeping-bent), to which the land is subject, was noticeable. Mr. Cave had drilled this field with 2 bushels per acre, and it had been hoed at a cost of 2s. per acre, and looked well. A field of 24 acres, of red and white wheat mixed, after oats, looked uncommonly good. Barley, after swedes eaten off with sheep in 1887, promised well. Nine pecks of Hallett's Chevalier had been drilled to the acre.

Oats, Hallett's pedigree white, and Webb's white Tartarian, 3 bushels drilled to the acre, looked very indifferent; but a field of 24 acres of white oats, after coleseed eaten off with sheep, looked particularly well, and was the finest field on the farm. Superphosphate had been applied to the coleseed; and 3 bushels of oats had been drilled to the acre.

Of seeds, the field of 14 acres was remarkably good, and had for some time been keeping 8 sheep per acre, besides some cattle and 4 horses. The sheep were getting $\frac{1}{2}$ lb. of oats

per day. On another field on the Fen land, of 23 acres, 16 acres were grazed, the remainder being kept for mowing. The seeds had been laid down without a grain crop in the preceding spring; but the crop was very thin, and no clover was visible.

Green crops were fairly promising. Mangolds, Suttons' Berkshire Prize, and Brown's Golden Tankard, were drilled on the flat 26 inches apart, 9 lbs. of seed to the acre. The land was prepared with 10 to 14 loads of farmyard manure, 3 to 4 cwt. of Webb's mineral superphosphate, and on one field 5 cwt. of salt. Swedes were also drilled on the flat 19 inches apart, with 2 lbs. of seed per acre, the land getting 10 loads of farmyard manure, with 3 cwt. of Meggett's superphosphate and dissolved bones. The land was three times ploughed and cultivated. All the green crops were, in the opinion of the Judges, thin in plant, and a little more turnip seed would have been desirable.

The live-stock on the farm in December 1887 comprised 8 working horses, 59 cattle, including 6 good cows in milk, 16 good feeding beasts, 23 two-year-old cattle, 9 yearling cattle, and 5 calves. The cattle were principally red Lincolnshires. From 20 to 25 fat cattle are fed off every winter. Mr. Cave has 7 acres of grass in the parish of Taddington and 35 acres in the parish of Braceborough in the county of Northampton, which were not included in the competition, but which the Judges considered it necessary to inspect. On this land cattle are grazed in summer, to be brought into the feeding-yards in winter. For these grazings the rent is 80*l.* a year. At the date of the Judges' last visit there were 27 steers and 5 heifers in calf on the larger grazing-field, all of which would come to the yards in winter. Milking cows and young calves are fed chiefly with barley-meal, but sometimes with crushed oats, on Mr. Cave's farm. Calves and young cattle up to 18 months old are very subject to blackleg, to prevent which Mr. Cave is accustomed to put a seton through the dewlap.

No breeding-sheep are kept, as lambs on this farm are subject to "rickets," but two lots of sheep are bought and fed off annually. In December we found 237 cross-bred lambs on the farm, which had been purchased at 26*s.* a head in October, and were sold fat in March at an average of 47*s.* each. A good lot of Lincolns were bought in April at 46*s.* a head. They were pastured on a field of seeds, getting 1 lb. of oats per day, and would be sold off by instalments as they were ready. Taking an average of three years, about 460 have been fed and sold each season, and on this item the returns of the farm largely depend. Owing to the light character of the soil and the excellent roots

produced on it, this holding is eminently adapted for sheep-feeding. The roots are consumed on the land, which at the same time is benefited by being trodden by the sheep.

The dairy produce of six cows brings in a good sum yearly. Mrs. Cave is a most practical farmer's wife, takes a direct interest in the dairy, and has obtained prizes for butter. It is rather discouraging that even such excellent produce must sometimes be sold for less than 1s. per lb. The dairy-premises seemed to be rather small, and partly underground, which cannot be wholesome, as it must be very damp in winter. A good profit is also made from poultry and eggs; this being the only one of the competing farms where much attention was given to these matters. With the dairy and poultry Mrs. Cave materially assists in paying the rent—a fact that is greatly to her credit.

Mr. Cave keeps very simple accounts, all the entries being in one book, a remark which applies to nearly all the competitors. The entry to the farm is at Lady-day, and the average outlay for the three years ending with 1887 may be stated as follows:—

Cattle bought 115*l.* 5*s.* 2*d.*, sheep 826*l.* 3*s.*, pigs 54*l.* 8*s.* 8*d.*, feeding-stuffs 337*l.* 8*s.* 6*d.*, labour 412*l.* 1*s.* 8*d.*, and manures 29*l.* 7*s.* 6*d.* The average receipts for the same period were: for cattle sold 436*l.* 8*s.* 2*d.*, sheep 1,067*l.* 9*s.* 4*d.*, pigs 120*l.* 10*s.* 7*d.*, corn and seeds 791*l.* 13*s.* 7*d.* For dairy produce the amount realised for the year ending Lady-day 1888 was about 100*l.* for eggs, and poultry 50*l.*, both of these items being about the average for three years. For wool the average was about 96*l.* a year. The cost of labour is about 1*l.* 11*s.* per acre. Wages in the district are 12*s.* per week, and eight labourers are usually employed, two of whom live in cottages; the others are hired.

The returns were not so large as those on the First Prize farm, doubtless owing to the farm being of a poorer nature; but the general neatness all round was superior, and the whole management was, indeed, exceptionally good. The land is thoroughly clean, and is kept up to a high state of cultivation. Stubbles are all scarified after harvest, and all rubbish burned—a practice worthy of general imitation. All the root crops, which in 1887 were remarkably good for the season, were lifted in November and put into heaps over the field, where they could be sliced as might be required for the sheep. They were pulled and topped and thrown into heaps at a cost of about 6*s.* an acre. The fences all over the farm were simply perfect. Hedges are cut three times a year, and all weeds cleared away at the same time, leaving them perfectly clean. They are likewise very narrow, with the land ploughed quite up to their roots, so

that no land is wasted. This example might well be imitated in other counties known to the writer, where fences are quite neglected, or managed in a most slovenly and ineffective style. Many old fences had been grubbed up by Mr. Cave's father and himself, so as to make the fields square. At their own expense they had planted about 80 chains of young hedges, some of which are now well grown up. The Judges specially admired the good workmanship displayed in laying these hedges, and also the excellent thatching and drilling upon the farm. Gates are provided by the landlord, and are good and substantial. They are all painted at the expense of the tenant. For some years it has been a hobby to keep the farm tidy; and one of my colleagues was quite enraptured with the general aspect of garden-like neatness that prevailed. The Judges had no hesitation in awarding the Second Prize to this farm, and in this award they were unanimous.

Three servants were named by Mr. Cave as deserving of recognition. Thomas Coulson has lived on the farm 34½ years with Mr. Cave's father and himself. He is a good stacker, has taken a prize for drilling, is honest and trustworthy among beasts in winter, and is a good all-round worker. Robert Wyles has lived in a cottage on the farm 27 years, is an excellent workman, discharges his duties well, and has taken a prize for drill-leading. He is a total abstainer, and is in all respects a trustworthy man. John Haddon has been employed 22 years on the farm as an ordinary labourer. He has given great satisfaction as a workman, especially in hedging, thatching, and draining.¹

CLASS 2.—VERY HIGHLY COMMENDED.

The Common Watnall Farm, Kimberley, Nottingham, occupied by Mr. Robert Goodall Hanson.

Watnall, where this farm is situated, is in the parish of Grimsby, one mile from Kimberley, a large colliery village, with 4,000 to 5,000 inhabitants, where there are two breweries, one of which belongs to Mr. Hanson.

The farm consists of 155 acres, of which 134 acres are arable and 19 pasture, with about two acres of roads. It is owned by Earl Cowper, K.G., and has been occupied since 1881 by Mr. Hanson, in succession to his father-in-law, who had been tenant for the previous 35 years. The gross rental is 200*l.*, and the rates and taxes amount to 24*l.* 13*s.* 8*d.* There are three cottages

¹ Certificates and money gratuities have been granted by the Society to each of these men.—ED.

included with the farm. A deduction of 10 per cent. on the rental has been allowed during the whole of Mr. Hanson's tenancy; but it may be stated that in August 1888, after the awards of the Judges had been published, Earl Cowper went over the farm and showed his appreciation of a good tenant by fixing the rent definitely at 170*l.* per annum, an arrangement quite satisfactory to the tenant.

Mr. Hanson occupies in addition two grass-fields of accommodation land from the same landlord; and also the Hall Farm, Watnall, 93 acres in extent, owned by Mr. Lancelot Rolleston, of Watnall Hall, formerly Master of the South Notts Foxhounds.

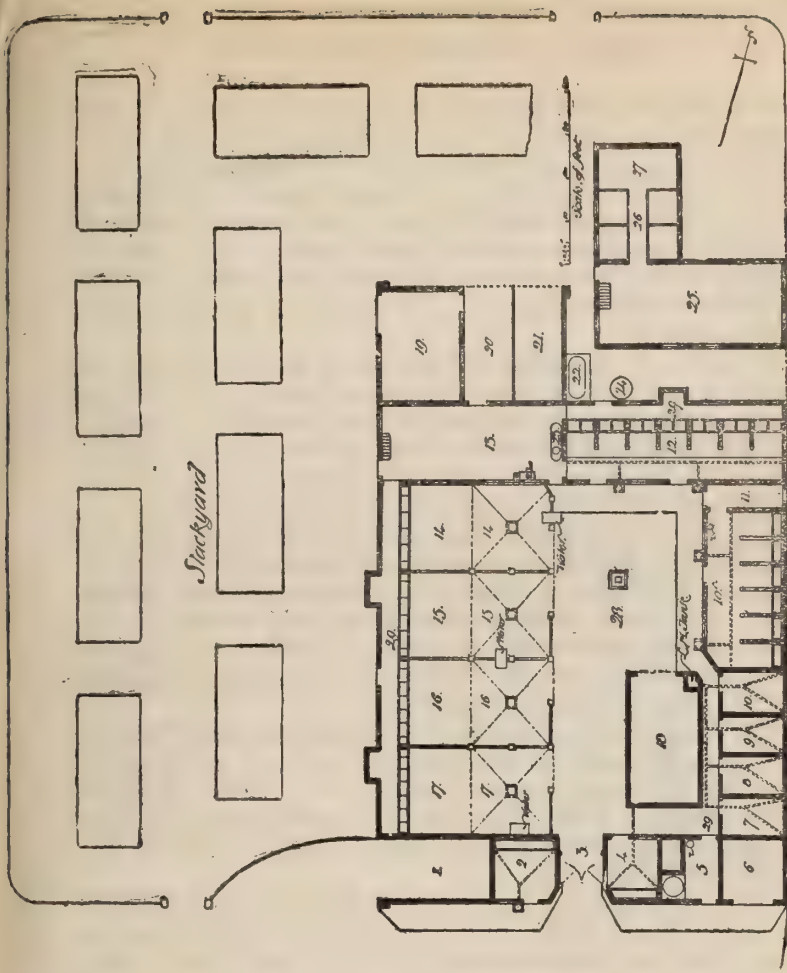
This holding is worked in conjunction with the competing farm, and a good useful herd of milking cows is kept for dairy purposes.

The Common Farm, which alone was entered for competition, is held on a yearly tenancy, with entry at Lady-day, and without any agreement, but with very liberal estate arrangements, and no restrictions regarding the sale of hay or straw. Indeed, a most amicable understanding seems to exist between Earl Cowper and his tenantry.

Mr. Hanson lives at Newdigate House, Kimberley, near his brewery. Three quarters of a mile distant is the Common Farm, close to Watnall Station on the Midland Railway. The farm buildings (of which a plan is given on page 63) have been lately constructed, and are of a very superior and high-class description. The plans were prepared and the work superintended by Mr. S. Taylor, then Earl Cowper's estate bailiff, now an architect and estate agent at Nuttall, Notts, who has obtained high honours as an agricultural architect, including a medal at one of the London Dairy Shows. Mr. Hanson did all the necessary team work for the buildings, including a good cottage for the foreman or stockman. The erection of the buildings was carried out by Earl Cowper's estate workmen. The homestead seemed to the Judges to be very well planned. In particular the arrangements for the accommodation and feeding of cattle are worthy of approval. Instead of two yards for young cattle there are four smaller divisions, which permit a better classification of stock. Accommodation for preparing food for the live-stock is specially good. The machinery of the farm, including one of Robey's mills for crushing corn, is driven by a 6-horse-power engine, which cost 200*l.*, and the arrangements for pulping, chaff-cutting, and steaming roots are very convenient. In the matter of the liquid manure, the principle adopted is to prevent as far as possible the mixture of rain-water with the solid or liquid manure. The open yard is kept clean and free from

NOTES TO PLAN:

- No. 1 Out and Wagon Shed
- 2 4 Horse or Cattle Box
- 3 Covered entrance
- 4 Food for Pigs and Calves
- 5 Gig House or Workshop
- 6 100 ft. 9 Pigsties
- 7 100 ft. 9 Pigsties
- 8 100 ft. 9 Pigsties
- 9 100 ft. 9 Pigsties
- 10 Stable—6 Horses
- 11 Food for Horses
- 12 Cowshed
- 13 Food-mixing House
- 14 & 15 Shed and Yard for Two-year-old Cattle
- 16 & 17 Shed and Yard for One-year-old Cattle
- 18 Covered Entrance Yard and Tank
- 19 Root Stores
- 20 Root Stores
- 21 Implement
- 22 Steam Boiler
- 23 Engine
- 24 Well, Pump, and Tanks, supplying Cattle Troughs and Taps by gravitation
- 25 Root Store
- 26 Chaff cutting Chamber (over Mixing House)
- 27 Granary (over part of Barn)
- 28 Upper portion of Barn
- 29 Clean Open Yard
- 30 Covered Gangways



FARM HOMESTEAD

—*Drawn by Mr. R. S. Hanson*—
 —*Walling Notes*—
 —*Belonging to the*—
 —*Right Hon. Earl Cowper & Co.*—

—*S. TAYLOR*—
 —*Architect*—
 —*Walling Notes*—

manure, and the rain falling on this portion is properly and separately drained away. There is a large covered manure-pit, which receives all the manure from cow-sheds, stables, piggeries, boxes, &c. The whole of the urine from the buildings is collected, without admixture with water, and conveyed to a small tank in the covered manure-shed, and is pumped (by a wheel-pump) on to the manure under the shed as required. This is a most admirable arrangement, and one that is worthy of more general adoption.

A feature in the construction of these buildings is that no perishable materials occupy any exposed position, and this reduces to a minimum the necessary outlay on repairs—an important item in farm homesteads. The precise cost of the buildings cannot be ascertained; but Mr. Taylor states that, while acting as estate bailiff to Lord Cowper, he made a point of providing sufficient, substantial, and convenient buildings, exclusive of farmhouse and cottages, at a cost not exceeding 4*l.* 10*s.* to 5*l.* per acre of the holding, and that this amount was seldom reached.

In addition to carting materials for the homestead, the tenant has laid 270 chains of fences, and made a hard road to the farm-buildings from the Nottingham and Alfreton turnpike, which he likewise keeps in repair.

The usual rotation of crops on the farm consists of (1) roots, (2) barley, (3) seeds for two years, (4) wheat; or (1) roots, (2) barley, (3) barley, (4) seeds, and (5) oats. The cropping for 1888 was wheat 9 acres, barley 46, cats 16, artificial grasses 25, mangold 2, swedes 22, common turnips 4, cabbages 1½, tares 2½, and potatoes 6.

The mixture of seeds for one year's ley consisted of 12 to 16 lbs. of red clover, 2 lbs. alsike, ½ peck to 1 peck Italian ryegrass. For two years the mixture is 4 lbs. red clover, 4 lbs. white alsike, 4 lbs. cowgrass, 2 lbs. ribgrass, and 1 peck perennial ryegrass.

It will be observed that Mr. Hanson grows a large proportion of barley, which is used for malting purposes in his brewery. He frequently finds the second crop of barley superior to the first for that purpose. The soil is better adapted for barley and root-growing than for other crops, consisting of a rather sandy loam, overlying the new red sandstone, which in many places crops out on the surface. For his second barley crop Mr. Hanson largely uses artificial manure, consisting of 2 cwt. superphosphate, and 1 to 1½ cwt. sulphate of ammonia. This treatment appeared to suit the barley crop admirably, as it all presented a capital appearance. For roots, of which Mr. Hanson had a most excellent plant, the manures were chiefly

2 to 3 cwt. mineral superphosphate and about 2 cwt. bone-meal, in addition to farmyard manure. For potato-growing kainit and superphosphate were used.

At first sight the farm was conspicuous for the excellence of its live-stock. Horses, all of the Shire breed, were particularly good, and formed quite a prominent feature of the farm. Mr. Hanson requires strong young dray-horses for his brewery, and breeds them for himself. There were two brood mares of the Shire type, one of them own cousin to "Premier," and in foal to "Defiance," sire of the First Prize colt at the Royal Nottingham Show. The second had a filly foal at foot by the Nottingham Corporation horse "Advance," and was again in foal to the same horse. There was likewise a good three-year-old filly (half-sister to "Laughing-stock") by "Merrylad" 2626, dam by "Hydraulic" 1130. This filly had taken many prizes, including the first at Newark as a yearling and as a two-year-old, and was in foal to "Defiance." Mr. Hanson is of opinion that a good business may be done in Shire horses. The breeder of "Laughing-stock," a small farmer, sold a foal from the same mare to Mr. Galbraith, of Hennington Hall, Grantham, for 200 guineas.

In December, there were 33 cattle, among which were 3 cows, 2 heifers, and 11 fattening bullocks—all fairly good—5 yearling heifers, 10 calves, a fat bull, and a pedigree bull, "Duke of Oxford" 52771. Most of the cattle had been bred on the farm, and all the younger animals were by the "Duke of Oxford." About 30 bullocks are fed on the farm yearly; and the price in 1887 averaged 22*l.* 7*s.* 6*d.* a head. Feeding cattle get 60 lbs. swedes, 6 lbs. crushed corn and peas, and 4 lbs. cake per day.

No breeding sheep are kept, but half-bred Lincolns and Hampshires are bought in to be fattened. In December there were 41 wethers and 83 hoggets, eating turnips on the land. From 150 to 200 sheep are fattened yearly, and sold at an average price of 55*s.* 6*d.* each. In 1888 it was expected that 300 would be fed. Sheep in the summer of that year were bought for 7*s.* a head higher than the year before.

Several breeding sows, of the large white breed, are kept, not for show, but in good condition for breeding; and for pigs there is a ready sale.

According to instructions the Judges considered it advisable to visit the Hall Farm worked by Mr. Hanson in conjunction with the Common. The general management was quite equal to that of the competing farm. It is customary with Mr. Hanson to rear as much young stock as he can at that farm, and to purchase any others that may be required for feeding pur-

poses. No separate accounts are kept, and it is thus impossible to ascertain the precise profit and loss on the competing farm. Nor does Mr. Hanson make a yearly valuation. His method is to employ occasionally an experienced valuer, and ascertain the worth of both farms just as if he were an outgoing tenant. Thus he can give the price received for fat stock, corn, and other articles sold off the farm, but not the precise value of the cattle as they come from the other holding.

For labour on all the farms the amount paid in 1886 was 455*l.* 2*s.* 6*d.*, or 34*s.* an acre; in 1887 it was 410*l.* 18*s.* 6*d.*, or 31*s.* per acre. The foreman has a cottage and 24*s.* a week, with coal and milk; the stockman a cottage and 18*s.* weekly; the shepherd 18*s.*, and the labourers 17*s.* a week.

At the first visit of the Judges in December, this farm did not appear to present any feature worthy of special attention, except the live-stock; but, as the competition advanced, it improved greatly. The tenant showed great energy as well as excellent management, and made a very close run for the Second Prize. As already stated, the cattle and horses were particularly good, while the crops of barley and roots were very promising.

As illustrating the altered conditions of farming, Mr. Hanson mentions that, owing to defective buildings, together with good markets before prices were lowered by railway facilities for transit and agricultural depression, the former tenant of the Common Farm was accustomed to sell nearly all the produce of the farm, and maintain the fertility of the land almost entirely by means of artificial manures.

CLASS 2.—COMMENDED FARMS.

*Woodthorpe Farm, Staveley, Derbyshire, tenanted by
Mr. Thomas White Bower.*

Woodthorpe is six miles north-east from Chesterfield, a town with 12,231 inhabitants, engaged in mining and iron-working. The area of Mr. Bower's farm is 192 acres, of which 127*a.* 2*r.* 20*p.* are arable, 60*a.* 2*r.* 1*p.* pasture, and 4*a.* 1*r.* 20*p.* occupied with house, gardens, orchard, and three cottages let along with the farm. Woodthorpe is held on a yearly tenure from the Duke of Devonshire, at a rent of 240*l.* a year, to which amount it was reduced in 1885, having previously stood at 292*l.* 4*s.* In 1887 there was paid for rates and taxes, including school rate, 34*l.* 7*s.* 8*d.*; tithes are paid by the landlord. The Duke is a liberal and considerate landowner, and agreements on the estate are generally satisfactory to the tenants. Mr. Bower has been eight years in the farm.

The climate of Woodthorpe is rather cold and late ; the rainfall is 34 inches yearly. Soil varies greatly, much of the farm being on the coal-measures, some of it a stiff clay, other parts a light gritstone, and so diversified that a furrow cannot be drawn across the fields anywhere without passing from one kind of soil to another. Where necessary the land has been drained, but still a portion of the grass gets trodden in wet weather. The farm is situated on a high hill, commanding an extensive prospect.

Mr. Bower sub-lets the farmhouse, and resides at another farm two miles distant, named Oxcroft, which he also occupies under the same landlord. On the west side of the farm is the homestead, stone-built, and very substantial. It is fully adequate to requirements, and everything was in excellent order. The tenant is bound to keep the house, premises, and outbuildings in good tenantable condition, and once in three years to paint all the outside iron and woodwork ; also to keep all fences and ditches in good order, materials for which are furnished by the landlord.

Mr. Bower is required by his lease to have at least one-fifth of the arable land in clean summer or turnip fallow every year, and to sow seeds with the first corn crop after such fallow ; also to consume on the farm all hay, straw, fodder, and green crops, except by the written permission of the landlord or his agent. The usual rotation consists of (1) oats, (2) wheat, (3) roots, (4) wheat, barley, or oats, and (5) seeds for one or two years. Seeds are usually left a second year if a good root of clover remains. The mixture for one year for mowing is : 10 lbs. red clover, 2 lbs. white, 2 lbs. alsike, 1 peck Italian ryegrass ; for two years' growing : 10 lbs. white Dutch clover, 2 lbs. alsike, 2 lbs. cowgrass, 1 lb. sheep parsley, 1 lb. ribgrass, and 1 peck Italian ryegrass. In 1887 he put in 3 lbs. cocksfoot in addition, as an experiment. The two-year-old seeds for grazing appear to be excellent pasture.

The average yield of crops on this farm is : wheat 4 quarters, barley $4\frac{1}{2}$, oats 6 ; potatoes 6 tons, turnips 18 tons, and clover or seeds $1\frac{1}{2}$ ton. Manures used are : for turnips 3 cwt. $\frac{1}{2}$ -inch bones and 2 cwt. dissolved bones, drilled with the seed. Every year Mr. Bower limes a large portion of the fallow, in which case farmyard manure is not applied. Lime costs 10s. per ton, delivered at a colliery siding within a mile of the farm. The average payments in the last six years have been for feeding-stuffs 190*l.*, and 60*l.* for artificial manures. The corn sold yearly during the same period was 340*l.*, and 163*l.* for hay, straw, and potatoes.

Horses on the farm included 5 working-horses, 1 light mare, 2 young nag horses, 1 yearling colt, and 1 two-year-old colt. In May, there were 2 good Shire-bred fillies, one by "Hydrometer," another by "Monster," eligible for the stud-book, a mare half-bred, and a foal by "Queen's Messenger" thorough-bred, a cart mare and foal Shire-bred. Mr. Bower has a great liking for good Shire-bred horses.

Cattle on the farm are chiefly shorthorns. In December there were 44 cattle: eight of them fat bullocks of the Hereford breed, and a large number of young cattle, many of them good, but others not of large size. The general system of cattle-management on Woodthorpe is as follows: About ten calves are reared annually, partly from heifers calved on the farm. To these are added a few bought from neighbours, who keep one or two cows and make butter. The calves are suckled by their dams till four months old, when they are weaned and other calves take their places. Eighteen steers are annually fed off. Fourteen cows or heifers are grazed, getting an allowance of cotton- or linseed-cake, and are sold off from June till October as they get fattened.

Sheep are chiefly Lincolns, but half the ewes are crossed with Hampshire or Oxford Down rams. In December 1887 there were 129, consisting of 59 ewes in lamb, to commence lambing on March 20, 55 feeding tegs, 13 shearlings, and 2 rams. Mr. Bower kept 73 ram lambs for feeding, as he considers that in that state they grow bigger and put on more flesh.

The cost of labour in 1887 was 223*l.* 4*s.* 11*d.* The ordinary wages in the district are, for a horseman or shepherd 20*s.*, and for common labourers 15*s.* per week. Mr. Bower's foreman has a house free of rent, a cow, and a supply of potatoes, with 12*s.* a week in cash. The shepherd has a house, with 15*s.* weekly, but his wage is supplemented by extra payments. Both foreman and shepherd are subject to a month's notice. Two young men, engaged by the year, are boarded with the foreman at the rate of 10*s.* weekly, paid by the master. The work is done by these four men and a boy, with such occasional help as may be required.

On Woodthorpe the profit and loss cannot be precisely ascertained, as Mr. Bower farms the holding at Oxcroft (260 acres in extent), for which he pays 260*l.* a year in conjunction with Woodthorpe. So far as could be ascertained, the value of stock sold would amount to nearly 1,200*l.* a year.

The farm presented a fairly good appearance, and seemed to be well managed. The land is not of high quality. A little couch-grass was visible, and the hedges might have been kept in

better trim. The corn crops were not so clean as they were on some of the other competing farms, doubtless owing to the fact that they had not been hoed. Mr. Bower believes, as many farmers nowadays do, that hoeing does not pay, owing to the high price of labour. Some of the grass-land was not particularly well managed, and the Judges found in some parts a superfluity of thistles. With these deductions, however, the farm was in good order and quite worthy of its commendation.

Joseph Hardwich, shepherd and general labourer, was recommended by Mr. Bower, as having been with him all the time he has farmed, and with his uncle for twelve years previously, and as being steady, industrious, and honest. A gratuity was accordingly awarded to him by the Council of the Society.

The Cliff Farm, near Kirkton-in-Lindsay, Lincolnshire, occupied by Mr. Charles Elmhurst Duckering.

This farm, properly called Hibaldston Cliff Farm, was likewise commended. Its extent is 173 acres, of which seven acres are in grass. It is owned by Mr. S. B. Skipworth, of Moortown House, near Caistor. The soil is light loam upon limestone, from which is made the blue lias lime, much used for building purposes all over that neighbourhood. It is a purely agricultural district. The nearest market-town is Brigg, seven miles distant, but there is a railway station within a mile of the house. The buildings are suitable for the requirements of the farm; and some alterations have been lately made by the tenant, partly at his own expense.

Mr. Duckering has occupied the Cliff Farm for three years, on a yearly tenure. The rent is 260*l.*, to which amount it has been reduced from 309*l.* within the past two years. Two cottages are included. The farm is tithe-free, and the rates, including poor and school rates, amount to about 20*l.* yearly. As the situation is good and the land dry, the farm is well adapted for sheep, and yields good root crops, but rather light crops of grain, though these yield well for the quantity of straw. The farm is compact, and the fields conveniently situated near the homestead.

Practically, the farm is under the Agricultural Holdings Act, 1883, except that, according to the practice of the locality, not more than six months' notice to quit is required. The tenant is bound to farm in a good husbandlike manner, with a four-course rotation, except on one field, from which he is allowed (though he has not hitherto done so) to take two white crops in succession. In case of quitting the farm, he is allowed one-

third of the price paid for cake in the last year of tenancy, one-sixth of that in the previous year, and so in proportion to the annual value of the feeding-stuffs. The cost of artificial manures used for green crops is likewise repaid. On the other hand, the tenant is bound to leave the buildings in as good repair as they were when he entered the farm.

Mr. Duckering also occupies Whitehouse, a farm of 85 acres in extent, owned by Mr. William Hamilton Fox, and situated about three miles from the Cliff.

The common rotation is (1) turnips, (2) barley, (3) seeds, and (4) wheat. Very few oats are grown in the district, only 660 quarters having been returned as sold at Brigg in a recent year. The produce of grain crops, as has been said, is poor, and is estimated at no more than 7 sacks per acre for wheat, and 8 sacks for barley. The mixture for seeds consists of 10 lbs. white clover, 3 lbs. alsike, 3 lbs. trefoil, one peck Pacey's ryegrass, and one peck Italian ryegrass.

Swedes are drilled on the ridge, 24 inches apart. The manure applied is chiefly fish-manure, prepared by Mr. Duckering himself, who is a manufacturer of artificial manures. Very good crops are produced. The farm is not adapted for cattle; the soil is too shallow, and there is little grass-land. In December, there were 9 good feeding bullocks, and one cow. Cattle had been sold to the value of 118*l.* during the year 1887, and 280*l.* in the previous year.

The breeding flock consisted of 115 Lincoln ewes, 165 Lincoln hoggets, and 15 fat ewes. In summer, the sheep are pastured on the seeds, getting also an allowance of cake daily. In winter they get turnips with cake. On October 22, 1887, two months previous to the visit of the Judges in December, Mr. Duckering had commenced to eat off the turnips with 181 sheep, chiefly lambs, to which an allowance of 112 lbs. of linseed and cotton-cake was given daily. The money received for sheep sold is about 495*l.* yearly; the cost for feeding-stuffs 349*l.* The sheep were principally a cross from Lincoln ewes, with a Hampshire ram.

A conspicuous feature of Mr. Duckering's farming consists in the breeding of pigs, which has been carried on for the past 37 years by his father and himself. For pigs he has obtained no less than 529 prizes at Shows of the leading Societies in England, as well as at Paris, Hamburg, and other Exhibitions. He has a large number of cups and gold medals that have been awarded to him. In December 1887 there were altogether 27 boars, 19 sows, 33 sows with litters, and 3 pigs. The sales would amount to about 500*l.* yearly.

The amount paid for wages in 1886 was 229*l.* 0*s.* 4*d.*, and 234*l.* 10*s.* 10½*d.* in the year following. Two men are engaged by the year at 16*s.* weekly, with cottage rent free. One is boarded in the farmhouse, and is paid 9*l.* 10*s.* with board. Others are hired by the week, and the ordinary wage in the district is 13*s.* 6*d.* in summer, 12*s.* in winter.

Mr. Duckering admits that he has not been very strict in keeping his farm accounts, but has depended solely on the valuation at Lady-day for ascertaining his financial position. So far as could be judged from the data supplied, the farm is financially quite successful. It is well-managed, and is all in good order.

Mr. Duckering has laid out on buildings and general repairs a good deal that is generally done by the landlord, and the buildings are all in beautiful order. They are all painted by the tenant once in two years, and everything is kept in excellent condition. Crops generally were looking very fair, considering the quality of the soil, which was so light that in one case a barley-field was much damaged by being blown. The land generally was clean, with the exception of a little couch about the sides and corners of the fields, and the farm as a whole was quite worthy of commendation.

*Babbington Springs, Marnham, Newark, Nottinghamshire,
occupied by Mr. John William Simpson.*

This was another Commended farm. Its area is 227 a. 3 r. 16 p., of which 97 acres are arable and 131 acres grass. Mr. Ernest R. C. Cust, Manthorpe, Grantham, is owner, and the farm is held on a yearly tenancy, not under the Agricultural Holdings Act, but, according to the custom of the district, with six months' notice on either side, and with permission to sell a certain quantity of hay. The rent is 200*l.*, to which sum it was reduced from 293*l.* ten years ago. Rates and taxes come to about 24*l.*, and there is a voluntary school rate of 10*s.*, but no tithe.

The farm is two miles from a railway station, and nine miles from Retford. It has a heavy soil, inclining to a nasty poor clay, on a clay subsoil. The climate is variable, but the average annual rainfall is under 28 inches. Mr. Simpson also occupies the farm of Woodcoats, 82 acres in extent, which adjoins the competing farm.

The house, which faces south, stands in a field near the road leading from Tuxford to Marnham, which passes close to the farm. Behind the house is Babbington Springs, well-known as

a good fox-cover. It is difficult of access, especially in winter, as there is no hard road across the fields.

Many new quicks had been planted two or three years since. These were kept very clean, but some of the hedges were very bad, and were to be grubbed up and quicks substituted.

Grass-land was poor, with a good many tussocks, but was well grazed. Mr. Simpson has broken up 16 acres of grass, the turf of which was pared and burned, and the ashes spread over the land. He has drained about 45 acres, $2\frac{1}{2}$ feet deep and 8 yards apart, with 2-inch tiles, at a cost of 4*l.* 10*s.* per acre; 25 acres being drained at the expense of the landlord, and 20 by the tenant. About 30 acres of mole-draining has been done by the landlord, 10 yards apart and 2 feet deep, costing 4*d.* per chain, with good results.

On the arable land the four-course system is adopted. Wheat, Golden Drop, is generally grown, and is dressed with farmyard manure. Barley, Webb's Chevalier, was looking well, with perhaps rather too much straw to yield a good result. Oats, black Tartarian, were good, the general average being 7 quarters per acre.

Grass for mowing was light. Three acres of permanent pasture laid down three years ago showed a good deal of white clover, but was very short and not a good crop.

Swedes and mangold, with 12 loads of farmyard manure and 4 cwt. dissolved bones drilled with the seed, looked clean. Turnips were sown on the flat 15 inches apart, with 12 loads of manure and 4 cwt. dissolved bones mixed with ashes. The manures commonly applied are bone phosphates drilled with the seed, mixed with ashes at the rate of 3 cwt. per acre.

A strong feature on this farm was the excellence of the live-stock. At the time of the December inspection there were 19 horses, 67 cattle, 136 sheep, and 13 pigs. There were five working mares, Shire-bred, in good condition and a very useful lot of animals; one brood mare, a thorough-bred hunting mare by "Martyrdom," besides a number of colts and fillies. The cattle, all reared on the farm, were shorthorns of various ages, generally very good. The cows are fed on chopped straw, malt-dust, and meal. Sheep were of the Lincoln breed, a very nice lot, especially the breeding ewes. Lambs were also very good.

On labour there is expended about 138*l.* yearly, not including board. Two labourers are engaged by the year at 15*s.* weekly, not boarded in the house; but two others, also engaged by the year, are boarded in the house, one having 17*l.*, the other 4*l.* a year. Additional help is obtained in harvest and for

thrashing. The wages paid in the district average about 13s. 6d. weekly.

In addition to the labour bill the average yearly outlay was, for cattle bought 27*l.* 10s., sheep 14*l.*, horses 49*l.*, pigs 5*l.* 10s., corn and seeds consumed on the farm 48*l.* 10s., feeding-stuffs, including oil-cake, 67*l.* 10s., manures 45*l.*, tradesmen's accounts 95*l.*, and sundries 37*l.* 10s. The sales for the year indicate a satisfactory profit. For corn and seeds the amount realised was 334*l.* 10s.

CLASS 3.—FIRST PRIZE.

*Grange Farm, Ruddington, Nottinghamshire, occupied by
Mr. Reuben Shelton.*

In the 3rd Class, for arable and grass farms above 25 and not exceeding 100 acres, there were 9 entries; and the First Prize was awarded to Mr. Reuben Shelton, of Grange Farm, near Ruddington. Ruddington is a village with 2,638 inhabitants, chiefly occupied in stocking-weaving. It is in the Rushcliffe Division of the county, on the road leading from Nottingham to Loughborough and Leicester. It is 5 miles from Nottingham, 10 north-west-by-north from Loughborough, and 2½ south-west from Edwalton Station on the Midland Railway. The area of the farm is 85 a. 13 p., of which 55 a. 1 r. 30 p. are arable, the remainder grass-land.

Grange Farm was previously owned by Mr. Charles Paget, the landlord of a large part of the parish, whose name is always mentioned with respect in the district, and who was ever ready to help all who were willing to help themselves. By him were erected the model buildings of which Mr. Shelton now gets the benefit. The present owner is Mr. Joseph Paget, J.P., of Stuffynwood Hall, Mansfield, Nottinghamshire. Mr. Shelton is a native of Ruddington, and is highly esteemed in the neighbourhood for industry and energy in connection with his business, and for the methodical way in which his farm is managed.

The soil is a sandy loam, on the new red sandstone formation; the subsoil varies. The climate is good, neither excessively wet nor very dry. In 1887 the rainfall was only 16 inches; but that was exceptional, the average being about 26 inches.

The dwelling-house was not originally designed for a farmhouse, and the rooms are very small and inconvenient. The farm-buildings are all of brick, slated, and very convenient. They form three sides of a square. First there is a well-arranged cow-house, containing sixteen standings, with short gutters

behind, beaten clay floors in front, and brick at the back. The mangers are also of brick, sloping from the four sides to the centre, and there are ventilators through the walls in front of each animal. Next there is a loose box, with room for three cows; then a four-stalled stable, and a mixing-house, with a granary above. On the opposite side is a cow-house, with accommodation for sixteen animals; then a small compartment for two, convertible into a loose box or a calving shed, and a third house for eight head of cattle. All the premises, including the cow-houses, are lighted with gas, brought from Nottingham, which the tenant regards as a great convenience. On the occasion of our visits the buildings presented unmistakable signs of being kept in excellent order. All the buildings, doors, and gates had been recently painted at the joint expense of landlord and tenant. This was, with one exception, the only instance which came under the notice of the Judges in which the landlord gave assistance in such work, and it manifested the good feeling which exists in this case.

The farm was thoroughly well cultivated, not a bit of couch-grass visible, fences clean, neat, and in admirable order, with a general aspect of careful attention to every detail. The stock was good, and large in number for the size of the farm, and a special feature was the great profit derived from that branch, the *bonâ fide* character of which the Judges were allowed the most ample opportunities of verifying. Accounts are kept in a style of careful accuracy that might be imitated with advantage by many a large farmer. The subject of farm-booking, indeed, cannot fail to impress itself upon the minds of those who undertake the adjudication of prizes on conditions the foremost of which is "the management with a view to profit." In many cases the difficulty of a decision was necessarily increased by the inadequacy of the data available for forming an opinion on this important point. It would not be too much to say that in some instances the competitors had probably never before known their own financial position so clearly as they did under the pressure imposed by the Society's conditions for some accurate statements respecting it. It is unnecessary to say that the Judges, in pursuance of their duty, satisfied themselves upon this point in every case; but it may certainly be said that they found it much easier to do so on some farms than on others. In Mr. Shelton's case their difficulty was minimised. The pity is that it should be at all exceptional. The casual way in which the accounts of agricultural undertakings, involving perhaps some thousands of pounds per annum, are kept would be inconceivable if it were not so common. A sound system of book-keeping

is the backbone of every commercial enterprise. It ought also to be so on every farm. No doubt some improvement has been made in this respect of late years, thanks in some measure to the attention given to the subject by the Royal Agricultural Society. But in reviewing the experience of a tour in counties where farmers—as these notes on their practice may prove—are certainly no more backward than in other districts, it is impossible to refrain from once more urging the essential importance of greater attention to the “office-work,” as well as the field-work, of the farm.

The Grange Farm is held on a yearly tenancy, and has been occupied by Mr. Shelton for 13 years. The whole has been drained 3 feet deep and 8 yards apart; and about 8 acres were re-drained 7 years ago; the landlord paying for the drainage, and the tenant carting the tiles. In 1885 the rent was reduced by 10s. per acre, but is still 234*l.*, which, with 27*l.* 10s. 11*d.* of rates and taxes, mounts up to fully 3*l.* an acre. The tenant is forbidden to sell produce such as hay and straw, and there are certain restrictions as to cropping; but no agreement has been signed since the passing of the Agricultural Holdings Act, 1883, under which the farm is now held.

The arable land is all in one field of 53 acres, enclosed in a ring fence, and the rotation is (1) roots, (2) barley, (3) part seeds or part beans, and (4) part wheat, part oats. Wheat, Webb's Improved Square-head, after beans, had been drilled at the rate of 2 bushels to the acre; and the appearance of the crop was exceedingly fine. Barley, nearly 15 acres of Webb's Kinver Chevalier, was very strong and good; barely 2 bushels had been drilled to the acre. Oats—8 acres of Webb's Challenge White, 3 bushels drilled to the acre—looked clean and strong at the time of the writer's visit in May, and in July had a splendid appearance, promising to yield 9 quarters per acre. Mr. Shelton drills all his corn 9 inches wide, so as to allow room for horse-hoeing, and the grain crops were all thoroughly clean. The average yield in ordinary seasons is about 6 quarters per acre.

Seeds are never laid down by Mr. Shelton for more than one year; and his method is to sow 14 lbs. of red clover, with $\frac{1}{4}$ to $\frac{1}{2}$ a peck of Italian ryegrass to the acre. In May the clover for mowing looked thin, but in July a heavy crop had been cut and secured in fine condition before the heavy rains of the season had begun.

Six acres of old grass for mowing that had been dressed with soil and farmyard manure was very good, and continued to look well at the final inspection. Eleven acres of grass,

similarly treated, looked fairly well in May. In July a great part of it had been cut and stacked in good order. Among the chief grasses observed were ryegrass, cocksfoot, sweet vernal, and crested dogtail.

Fourteen acres of grass, pastured in May with 16 cows, and regularly watered with liquid manure, looked splendid, and at the time of our final visit was still pastured with 16 cows, besides horses. Mr. Shelton always arranges so that one of his grass-fields on which cows are kept may be thus treated, and the result is a great flush of grass. There was no difficulty in observing where his liquid manure had been distributed, and only by virtue of some such treatment could so many cattle be maintained on a comparatively small field. All the manure dropped by the cows during the season is regularly and carefully picked off or knocked over the field—a process which prevents the growth of grass in coarse tufts such as cattle refuse to eat.

Green crops receive special attention from Mr. Shelton, who is wonderfully successful in the cultivation of mangold, for which and for swedes he has taken, at different times, 31 prizes at the Shows of the Ruddington Agricultural Society. In April 1888 nearly 11 acres of Webb's Champion Yellow Globe mangold were drilled on the flat 23 inches apart. It was just coming up at the time of the writer's visit in May. In July it looked an absolutely perfect crop, the best that the Judges had seen anywhere during their inspection. Mr. Shelton's ordinary method of mangold cultivation is somewhat as follows: As soon as convenient after the previous year's grain crop has been harvested the stubbles are carefully inspected, and all beds of couch-grass dug out with a fork. The land is then broken up, being twice worked lengthways and across with a Coleman four-horse cultivator with the grubber tines. This autumnal cultivation is very important, particularly on land that is never treated as dead fallow. In this rough, open condition it is left to the various atmospheric influences for some weeks, after which it is covered with good farmyard manure at the rate of 26 to 34 loads, according to circumstances. This is well spread over the land, which is afterwards winter-ploughed, a process which is generally completed by the middle of December. About the last week of March, if the weather be favourable, the land is worked twice over with a Howard four-horse drag; and in the end of the first week of April, or during the second week, it is harrowed more lightly, and rolled sufficiently to bring it to a fine and somewhat firm tilth. About $3\frac{1}{2}$ to 4 cwt. per acre of Webb's mangold manure is sown broadcast just before the later harrowings. Seven pounds of Webb's Champion Yellow Globe mangold

seed are drilled to the acre. Whenever the young plants appear above ground they are horse-hoed, then left till ready for thinning, which is usually completed in the end of May or beginning of June. The necessary horse-and hand-hoeings follow at intervals till towards the close of July, when the crop is left thoroughly clean.

Swedes (Webb's Imperial) were just coming above ground at the date of the May inspection. On the 4th of the month they had been drilled on the flat 23 inches apart, with 3 cwt. of Webb's No. 2 turnip manure per acre. In July they were a most excellent and promising crop.

The stock was as follows:—

Stock	December	May	July
Horses	7	7	4
Cattle	40	35	19
Pigs	2	3	3

No sheep are kept on the farm.

In December there were three working horses, a three-year-old nag filly, a two-year-old colt cart-horse, a yearling cart-horse, and a yearling nag foal. The three-year-old filly gained the second prize at the Trent Show in 1887 in the driving competition. All the horses were good and useful animals.

The leading feature of the farm is the dairy, and Mr. Shelton's method of management seems to be unique. The cows vary in number, but on an average there are about 22 in milk, all shorthorns. The system usually followed, which is justified by an experience of many years, may be briefly described. The custom is to turn out to grass in the beginning of the season cows in full milking order that have been purchased late in winter or early in spring to replace cows that have been turned into the sheds to be fattened ready for sale in the late spring or early summer months. During the first fortnight the cows are turned out only during the day, and get as much feeding in the sheds as during the winter months. As the grass improves in character the supply of winter food is gradually diminished, till they are supplied with 4 to 6 lbs. of mixed linseed and decorticated cake per day, which amount is kept up all through the season. About 16 or 17 cows are turned out at first, but these do not keep up the supply of milk for more than a few weeks when grass is at its best, and additional milking cows are, therefore, bought as required in summer and autumn. In addition to the cake above-mentioned, they are supplied early in autumn with green clover and early turnips as may be required according to the condition of the pasture. Mr. Shelton makes it a rule not to leave cattle out during the night earlier

than the beginning of June nor later than the end of September. He considers that this is better for the cows, and it makes the grass last much longer.

The farming of Mr. Shelton is carried on with a view to the production of milk and beef. His aim is to purchase, not high-priced animals, but such as are susceptible of improvement. In this way he obtains a sufficient supply of milk, and afterwards he invariably sells his animals 40 per cent. higher than the price he paid for them. All his cattle are most liberally fed, with a view to have them sold for beef soon after they have ceased to give milk. His cows are usually fed off within the year after he has bought them; and in July the Judges saw only two that had been on the farm in December. For feeding cattle the mixture per day is 2 lbs. decorticated cake, 2 lbs. Waterloo cake, 2 lbs. linseed-cake, 2 lbs. barley-meal, about 33 lbs. swedes, and 1 peck of straw-chaff mixed with dissolved linseed-cake.

Mr. Shelton is very decided in his advocacy of liberal feeding as the method to attain success in farming. After long experience in dairy management and in the fattening of beasts he expresses his unwavering conviction that by giving animals 6 to 8 lbs. of cake and meal per day he can produce double the quantity of milk and beef, and obtain 50 per cent. better returns than he could do by adopting a more parsimonious method. He believes that if farmers could be induced to see the benefits of liberal feeding judiciously directed they could keep more stock on a given area than they do at present, and would have better and more rapid returns. Attention to this matter often makes all the difference between remunerative farming and the reverse. At present, especially when the best feeding-stuffs can be bought for less than 1s. per stone, it is really suicidal for farmers to keep poorly fed cattle.

The milk, measured daily, is sold to a local milk-dealer, by whom it is retailed in Nottingham. The price obtained by Mr. Shelton is $7\frac{1}{2}d.$ per imperial gallon in summer, and $8\frac{1}{2}d.$ in winter: and this at the dairy, without any trouble or any deduction for carriage. A few years ago the price was one penny per gallon higher summer and winter; but more people have gone into the milk trade, and the price has therefore decreased. The quantity produced yearly is about 19,000 gallons, and the accounts made up to July 31, 1888, indicate the subjoined returns for the past seven years:—

	£	s.	d.		£	s.	d.
1882	742	7	9	1886	644	13	6
1883	714	6	5	1887	625	7	3
1884	705	19	3	1888	647	17	8
1885	656	17	9				

This statement includes the quantity of milk actually sold, but not milk used in the house, amounting to about three gallons daily. The receipts from the purchase of beasts in the same series of years will appear from the subjoined statement :—

Year	Beasts bought			Beasts sold			Difference between the purchase and sale prices		
	£	s.	d.	£	s.	d.	£	s.	d.
1882	511	12	6	630	10	0	118	17	6
1883	674	10	0	800	5	0	125	15	0
1884	395	15	0	514	14	6	118	19	6
1885	415	7	6	551	8	0	136	0	6
1886	365	12	6	744	11	6	378	19	0
1887	469	17	6	720	3	0	250	5	6
1888	662	9	6	920	3	0	257	13	6

Taking an average of these seven years, the money received from milk, together with the sale of beasts, was 875*l.* 11*s.* 6*d.* yearly. Corn sold on an average for three years at 182*l.* The payment for cake and feeding-stuffs was 222*l.* 16*s.* 3*d.*, taking an average of three years; manures 27*l.* 7*s.* 9*d.* for the same period. A good deal of manure is purchased in Nottingham at 3*s.* per ton, chiefly stable-dung. This is taken to the yard, spread out and mixed with the manure of the cattle, which is rich and strong owing to the quantity of feeding-stuffs consumed.

The cost of labour, taking an average for the same period, was 184*l.* 3*s.* 8*d.* a year. There are no cottages on the farm. A carter and stockman are each paid 18*s.* to 20*s.* weekly, with extra payment in harvest. Three young men for milking cows are boarded in the farmhouse, and are paid on an average 1*l.* to 13*l.* each yearly. Additional help is obtained in harvest and for securing mangold.

This outlay is not large, considering that no part of the farmwork is neglected or performed in a slovenly style. Neither money nor effort is spared with a view to obtain the best possible return from the land; but the more ornamental departments of rural economics are not less carefully regarded. The general aspect of neatness is exemplified in a long hedge separating the arable from the grass fields, which a competent authority described as "not only a credit to Mr. Shelton, but, after all, the most remarkable feature upon the land." Narrow at the bottom, thick in the centre, and with a sharp edge at the top, it was even and well-grown throughout, and, moreover, the land was perfectly clean up to the roots, a horse-hoe having been run from end to end. This hedge was not made in a day; it is the result of very careful and prolonged attention, and could not have been done with any view to farm competition.

The career of Mr. Shelton has been exceedingly creditable, and, as he makes no mystery about the matter, the facts may be briefly stated. With pleasure and gratitude he states that the late Mr. Charles Paget started several of his labourers and others known to be deserving on a career as farmers, letting to each a few acres of land, encouraging and directing their useful efforts, and increasing their holdings judiciously, till, by industry and perseverance, several of them attained a good position, and some were able to place their sons also in comfortable farms. They were working-farmers, men who could "hoe their own row" and show others how to do it. Mr. Shelton doubted if any other tenantry could be found in England who had got through the years of depression with less difficulty, who were more ready with their payments, or who could show farms so free from weeds or generally in such good condition. In addition to liberal treatment of land and live-stock a great feature in their management is to give personal attention to details, and leave nothing in the hands of others which could with greater advantage be done by themselves, and if any have come short they are those who neglected these rules. Among the young men thus assisted was Mr. Shelton's father, who, as a boy, worked under Mr. Paget on the Grange Farm, part of which is now occupied by Mr. Shelton himself. His own career as a farmer began 14 years ago, and his capital was small; but now he is not only unencumbered, but has a substantial amount of invested capital. The farm is small, the rent is high, the total expenditure is about 10*l.* per acre for the entire holding, and it seemed almost incredible that so much money should be realised. The evidence produced was, however, quite convincing; and after inspecting the details of the accounts for a series of years with the greatest care, no doubt could be entertained regarding the accuracy of the figures.

The Judges had no hesitation in awarding to Mr. Shelton the First Prize, as all through the contest he was far ahead of his rivals in every department of farm industry.

In some respects there was perhaps no farm in the competition from which a more instructive lesson for the times might be deduced. Here was a small holding, with a rent of 3*l.* per acre, and an expenditure on feeding-stuffs and labour of nearly 7*l.* per acre, giving an average yearly return for interest on capital and profit of something like 3*l.* 10*s.* per acre. This system tends in the direction of that intensive agriculture of which we have lately heard a good deal. No doubt the circumstances are exceptional, and Mr. Shelton has the great advantage of occupying first-class land. It may also be said that he

evidently possesses unusual judgment in buying stock, and is no doubt gifted with that "eye for a beast" which comes by nature and not by education. Nevertheless, his enterprising and intelligent management deserves all praise, and is in many respects worthy of imitation by farmers in other districts.

CLASS 3.—SECOND PRIZE.

(a) *East Bridgeford Farm, Radcliffe, Nottinghamshire, occupied by Mr. John Baguley.*

The Second Prize in this class was divided between Mr. John Baguley's farm of East Bridgeford, Radcliffe, Nottinghamshire, and another. This farm comprises 50 a. 3 r. 4 p. of arable, and 19 a. 36 p. of grass-land. It belongs to the President and Scholars of Magdalen College, Oxford. The soil is a sandy loam on the new red marl. Gypsum is found in the district, and is prepared for sale. The farm is held on a yearly tenure at a rent of 120*l.* 16*s.*, including one cottage, a reduction from 146*l.* 10*s.*, at which it was formerly rented. It is tithe-free, and the total amount of rates and taxes is about 11*l.* a year. In the district farms are small, many of them 50 to 200 acres; and allotments for labourers are numerous.

East Bridgeford is three miles from Bingham, a scattered agricultural village, with 900 inhabitants, and ten miles from Nottingham and Newark. The house is pleasantly situated in the centre of the village, with a charming prospect which includes the vale of Belvoir. The garden was clean and well-cropped, and contained a good many fruit trees. About 8*l.* a year is made by the sale of fruit.

Adjoining the house are the farm-buildings, very unpretentious, but sufficient for the requirements of the holding. Hedges were neat and well trimmed, but a good deal of rubbish could be seen in the ditches, and some docks about the hedges. The gates were very good; and Mr. Baguley is very careful about his implements, keeping them all under cover. This is usually a sure sign of a careful farmer. In all departments great neatness was displayed, and the farm appeared to be altogether well managed.

The tenant is bound to cultivate the land in accordance with the most approved custom of the neighbourhood, not to have more than two corn crops in succession, not to sow any brown mustard for seed, and to consume all green crops on the premises with sheep or cattle. The common rotation is (1) turnips or mangolds, (2) barley, (3) seeds, (4) wheat, and (5) oats.

Corn crops did not look particularly well, and at the final inspection did not look so favourable as the Judges had expected earlier in the season. The corn was in some places rather thin, and having been drilled both ways could not be hoed, in consequence of which many annual weeds had grown up. The average yield of grain crops is wheat 5, barley $5\frac{1}{2}$, and oats 7 quarters per acre.

Seeds for mowing (6 acres in extent) were a light crop, deficient in clover, and consisting chiefly of ryegrass. The mixture was 12 lbs. red clover, and usually a peck of ryegrass. Mangold (Webb's Champion Yellow Globe and Long Red) was drilled on the flat 20 inches apart. Farmyard manure to the extent of 25 loads per acre had been applied; and a top-dressing of soot and nitrate of soda had also been applied. Crops of peas (Prince of Wales), tares, and potatoes were good and clean.

The land was very well farmed. Mr. Baguley purchases Nottingham Corporation manure at 2s. 6d. per ton at Nottingham; after which he carts it ten miles—a cost that the land certainly cannot bear. The Judges considered it would have been more advantageous to have used artificial manures.

The live-stock included 8 horses, of which 2 were breeding mares, one of them in foal, one working horse, 3 yearlings, 1 four-year-old nag, and an old horse. There were 23 shorthorn cattle in December, 8 of them cows in milk—very useful-looking animals—a shorthorn bull, a cow in calf, and young stock. Milk is sent to London from Bingham Station on the Great Northern Railway. During winter and till March 25 it sells at 1s. 8d. to 1s. 9d. per barn gallon, in summer at 1s. 1d., the sender paying the carriage, which is 2d. per gallon. Butter in small quantities is sold, as two meals of milk during the week are not sent to London. Milk cows are fed with straw cut by horse-power, mixed with roots, crushed oats, 3 lbs. linseed-cake, and brewers' grains from Newark.

A very few sheep are kept, principally of the Shropshire breed. Poultry and eggs are sold to the extent of 15*l.* a year.

Labourers are plentiful in the district, and are paid about 12s. weekly. Formerly the rate was 13s. 6d., but wages have been slightly reduced. Mr. Baguley is assisted by his two sons, by whom, with the assistance of one labourer, nearly all the farm-work is done. The cost of labour is about 78*l.* 17s. yearly. Payments in 1887 were for cattle 33*l.*, sheep 20*l.*, cake and artificial food 74*l.*, crushed corn 45*l.* 19s., manures 9*l.* 15s. 5d., and tradesmen's accounts 12*l.* 15s. Taking an average of three years, the income showed a moderate balance over the expenditure.

At the first inspection the condition of the farm was found

to be good, and the general management commendable, with very many good points, and had the crops in summer turned out according to expectation the farm might possibly have occupied a still higher place. Unfortunately the ploughed land did not show very well, and, with the exception of one field of oats, the crops did not exhibit any special merit.

Mr. Baguley has raised himself by his own industry from a humble position ; and it was a pleasure for the Judges to find among the competing farms men who had been the architects of their own fortune, and were maintaining themselves with so much credit. They had much satisfaction in awarding to Mr. Baguley a prize. The farm was an interesting example of the combination of corn-growing and milk-production, which, even in these days of low prices, can still be carried on at a profit, with careful management.

*(b) Hucknall Torkard Farm, Nottinghamshire, occupied by
Mr. James Widdowson.*

This farm divided the Second Prize with that last described (Mr. Baguley's). Strictly speaking, it can scarcely be termed a farm, as it consists of a number of fields scattered irregularly about the outskirts of a large and populous parish. Hucknall Torkard is a parish and town with a station on the Mansfield and Nottingham branch of the Midland Railway. The town is in the centre of a colliery district, and contains about 11,000 inhabitants. It is 133 miles from London by rail, eight miles west from Nottingham, and eight south from Mansfield. The church is a fine old building, recently restored, and contains the tomb of Lord Byron. Newstead, Annesley, and Batwood collieries are within three miles from the town ; and other coal-mines are still nearer, one having a seam of coal eight feet thick and giving employment to 1,500 men. The Duke of Portland is lord of the manor, and owns most of the land in the neighbourhood, but there are some freeholders.

The total area of Mr. Widdowson's farm is 76 a. 2 r. 7 p., of which 54 a. 2 r. 7 p. are arable and 22 acres grass-land. An isolated field, 19 acres in extent, is owned by Mr. J. H. Godden, Nottingham ; the remainder belongs to the Duke of Portland. The rent is 127*l.* 4*s.* ; rates and taxes, including school rate, 28*l.* 12*s.*, of which half has latterly been paid by the landlord, equivalent to a deduction of 14*l.* 6*s.* from the rent. Mr. Widdowson has occupied the land about ten years, on a yearly tenure, under the usual conditions in the district. The farm is not under the Agricultural Holdings Act. The soil is friable, and the

subsoil is magnesian limestone, which at some points rises to the surface.

Mr. Widdowson lives in his own house, very pleasantly situated, walled in from the village, with a large well-kept garden, and a vinery, in which he takes great pride. Mr. Widdowson is also a corn and seed merchant, has a malting business, and collects the rents of allotments for the Duke of Portland. Under the duke there are 436 allotments, each 600 square yards, for which the sum of 6s. per annum is paid by the occupant. An addition of 120 more allotments was to be made during the present winter. About 26 acres belonging to Weightman's Charity are similarly divided.

Mr. Widdowson's farm-buildings are at a distance from his house, and are the least pretentious of any that the Judges were called to inspect. They are situated in two different parts of the village, are built of brick, roofed with Bridgewater tiles, and are not at all modern in construction or arrangement. There is no proper stackyard, but the ricks are fenced round with iron rails on wheels. There are four cottages included with the farm.

Mr. Widdowson is a high farmer, and manures his land very heavily, in which practice he has great faith. He buys all the night-soil that can be got for 2s. 6d. per cubic yard, delivered on the land; and the payment for this is 40l. yearly. For linseed-cake and artificial manures he pays about 178l. a year. His crops, however, were not nearly equal to those on the First Prize farm, and some couch-grass and docks could be found on the land.

The root crop of 1887 as seen in December was very good. A field of mangolds, and another of swedes, had taken the first prize at the annual Show of the Greaseley Agricultural Association, which has existed forty years, and of which Mr. Widdowson has been a member since its formation. The swedes, which had been sown in drills, were ploughed in to protect them from the frost. Two rows were converted into one, a system very generally adopted in the Midland districts, and the swedes were eaten on the ground with sheep.

The wheat in May and July appeared clean, but a little thin in some places, though it was filling out and promised to be a good crop. Barley (about 9 acres of Chevalier) on the limestone was very good, strong, and exceptionally clean. Oats (7 acres of Poland), after two years of seeds, manured three years in succession, looked like being an excellent crop.

The grass for mowing first year was good; second year seeds were light, with no clover, but only ryegrass. A field of 11 acres of two-year seeds, grazed with sheep, was thin in clover,

but a good pasture. Eight acres of permanent pasture, which had been laid down four years, pastured with cows, was full of feed; but many of the grasses were coarse, with a good deal of Yorkshire fog. For clover and seeds the mixture is 4 lbs. red clover, 2 lbs. ribgrass, 4 lbs. cowgrass, 2 lbs. trefoil, 2 lbs. white clover, 4 lbs. alsike, and 1 peck perennial ryegrass.

For the root crops the land had been liberally treated, about 225 cubic yards of night-soil having been laid on 10 acres for swedes and mangold, in addition to lime at the rate of 6 tons per acre, and drilled with Sutton's Champion and King swede. The mangold was rather a thin plant.

The average yield of the different crops was stated as follows: wheat 5 quarters, barley 6, oats 7, swedes 30 tons, hay $1\frac{1}{2}$, and seeds 2 tons per acre. A stack of two-year-old hay was sold during the summer for 260*l*.

There were three working horses—a nag horse, a three-year-old, and a two-year-old—all good. Cattle were exceptionally good, especially the cows, 10 in number, all shorthorns. It was computed that considerably over 20*l*. a year would be made from each cow. They are fed with 4 lbs. of cake daily during summer, and with mangold in spring. Mrs. Widdowson, though somewhat infirm, takes direct personal charge of the dairy, in which she has great pride. She is also very kind to the poor, and is much respected. There is a ready market for milk at Hucknall, where it is sold at 1*s*. per gallon, butter at 1*s*. 6*d*. per lb.

No breeding sheep are kept. The system is to buy hoggets in spring, to be fed on pasture and linseed-cake during summer, and shearling wethers in autumn, to be fed with turnips and cake in winter. Thus two lots are fed off yearly. In December there were 79 shearling sheep, bought for 163*l*. 10*s*.; they were sold for 200*l*. 1*s*. in April. The sheep generally are a Norfolk breed, of a type which prevails particularly about Lynn.

The cost of labour was stated at 120*l*. a year. There are kept regularly one cowman, one horseman, and two labourers, all of whom are paid at the rate of 18*s*. weekly. Additional help is obtained in haytime and harvest.

So far as could be ascertained, the sales of grain in 1887 amounted to 250*l*.; but the Judges were surprised to find that Mr. Widdowson keeps no farm accounts. No sufficient figures were put before them to enable them to know with certainty to what extent the farm was paying. They were fairly satisfied that the management adopted was on the whole profitable, but it would have been more satisfactory if the questions put by the Society on this point could have been more fully answered.

CLASS 3.—HIGHLY COMMENDED FARMS.

*Strithfield Farm, Alfreton, Stretton, Derbyshire, occupied by
Mr. Arthur Milner, senior.*

The farm of Strithfield, near Alfreton and Claycross, Derbyshire, occupied by Mr. Milner, was highly commended. To this farm, under the same occupancy, in 1881, was awarded the First Prize for small dairy farms at the Derby Show of the Royal Agricultural Society—a sufficient indication that the good management found therein is habitual. Strithfield Farm adjoins the Derby and Chesterfield road, is seventeen miles north from Derby, six south of Chesterfield, the market town, and one mile from Claycross, a village containing 3,000 inhabitants, and surrounded by large coal and iron works. The Midland Railway passes through the farm, and there is a station at Stretton.

The farm, with the exception of 6 acres which belong to Mr. Milner himself, is owned by Mr. W. G. Turbutt, J.P., of Ogston Hall, Alfreton. Of 87 a. 1 r. 19 p., there are about 40 a. 3 r. 19 p. arable, and 44 a. 2 r. grass-land. Mr. Milner was born on the farm, and has been tenant for 20 years, having succeeded his father, who entered on the holding at Lady-day 1832. It is held on a yearly tenure, with six months' notice to quit on either side. It is not under the Agricultural Holdings Act, except that compensation can be claimed under that Act, and by the custom of the district, for cake $\frac{1}{4}$ and $\frac{1}{8}$, draining done by the tenant on a two years' principle, full value for $\frac{1}{4}$ of the hay and straw of the previous year's produce, and for manure made from that year's crops. Hay and straw may be sold by one tenant to another on the estate, but not to others except by permission. Allowance is made for manures bought, for lime, bones, &c., on a two or three years' principle. Every farmer on the estate is allowed to crop as he pleases, and is not interfered with so long as he farms well.

The rent of the land occupied by Mr. Milner is 99*l.*, to which it was raised from 81*l.* 4*s.* ten years since. His own land is valued at 10*l.*, making a total of 109*l.*, or about 25*s.* per acre. Tithes, poor rates, sanitary, school and water rates are paid by the tenant, amounting in all with the rent to 137*l.* 10*s.* 4*d.*, or 1*l.* 11*s.* 7*d.* per acre.

There are 12 acres of light land on the farm very easily worked, and capable of growing almost any kind of crop; but upon the greater portion of the farm the soil is very heavy, more adapted for growing wheat than oats. It is so adhesive that in autumn the footprints of horses will hold water like a basin,

even over drains, until dried up by frost. The wet summers were very disastrous, especially to grass-land, on which the growth of coarse bad grasses could not be repressed. On different occasions Mr. Milner has been awarded eight silver cups and a still larger number of money prizes by local societies for the best managed farm in the district. One of these honours was awarded "for the best managed farm in east Derbyshire."

The farmhouse, situated near Stretton Station, is built of stone peculiar to the district, faces south, and commands a charming prospect, but is rather an old-fashioned building. The homestead is of stone, very substantial, only recently built, and sufficient for requirements.

When first seen by the Judges the farm looked poor, but well managed. Most of it had been drained some years before, and the drains were acting well; they were 30 inches deep, the mains 36 inches; some were 4 yards, others 6 yards apart. The cost was about 8*l.* per acre, and the work was done partly by the tenant alone, partly by the landlord alone, and partly by the landlord providing tiles and the tenant doing the labour. Five small fields had been laid down in permanent pasture. After the first year's crop the grass was said to be very poor for some seasons, even though covered every year with farmyard manure, besides an occasional application of artificial manures. After four years it is usually at the worst, and afterwards improves year by year up till twelve years or more, getting an application of manure every year. A field lately laid down to grass was not good, being full of water and couch-grass. The old grass-land was a conspicuous feature on the farm, and when the writer saw the farm in May it looked remarkably well.

There are no cottages on the farm. Fences were very good, and gates in excellent order. The climate is fairly good; at Chesterfield the rainfall being in the twelve months ending with September 30, 1887, 23.57 inches.

The four-course system is adopted. On the heavy soil the rotation is, (1) vetches, cabbages, and sometimes a few roots, (2) wheat, (3) seeds, (4) oats. Latterly about one-third of the heavy soil, which fell due for vetches and cabbages, has been summer-fallowed. According to this plan, which Mr. Milner believes to be an improvement, the heavy soil comes into fallow once in twelve years, and the extra crop of seeds after fallow, with better oats and less labour, will generally counterbalance a crop of vetches.

Crops in that district are at least a fortnight later than they are in the home counties, and, owing to the severe spring, they were in 1888 about ten days later than usual. Though well

treated, the grain crops were obviously struggling against adverse conditions of soil and climate.

Root crops are drilled on the ridge 23 to 24 inches apart; cabbages are grown on the flat about 36 inches between the rows. The artificial manures used are chiefly Procter and Rylands', at the rate of 5 cwt. to the acre, sown broadcast on the top of the farmyard manure in the ridges before earthing up. The cost is 2*l.* per acre. In addition to this, from 15 to 20 tons of farmyard manure are applied per acre, with 5 or 6 cwt. of salt, and on the heavy soil about 12 loads of ashes and night-soil.

The cattle on the farm are shorthorns brought from Yorkshire. The object is to have good milkers, and at the same time animals that are likely to suit the butcher when they are done with for milking. Cattle from Yorkshire and the limestone land of Derbyshire are found most suitable for poor land, like that occupied by Mr. Milner. In May there were 37 cattle, of which 19 milking cows, 3 feeding cattle, 1 bull, 8 rearing calves, and 2 yearlings, together with 2 working horses, were pastured in the grass-fields.

Mr. Milner has a high reputation for making Derbyshire cheese. About 2½ cwt. are made from each cow, and sometimes 3 cwt. in a dry season, which is most suitable for the land. It is generally sold for about 70*s.* per cwt. Butter is made, and milk sold during winter and spring. The dairy is managed in the way described in the *Journal* for 1881, but more milk is now sold, the price of 6½*d.* per gallon of four quarts, delivered on the premises without expense or labour, being regarded as satisfactory.

Pigs are of the middle white breed, and numbered 19 on the farm in December.

Mr. Milner, more than any other of the competitors, attends to the breeding of poultry. He had about 140 fowls, including Game, Plymouth Rocks, Dorkings, Leghorns, Brahmas, Bantams, and cross-breeds, besides a number of turkeys and ducks. It would be well if this minor, but none the less highly important, department were equally well managed on every farm.

The cost of labour in 1887 was 139*l.* 3*s.* 7*d.*, or about 1*l.* 11*s.* per acre. Most of the work is done by servants boarded in the house and engaged for the year. The head-man gets 18*l.* 10*s.*, the horseman 12*l.* to 14*l.*, a boy 4*l.* to 7*l.*, and an extra servant from May till November 4*l.* to 7*l.* Day-labourers get 2*s.* 6*d.* per day, or 15*s.* weekly, with food and beer. The weekly wage of labourers regularly employed on the farms in the district is from 1*l.* to 1*l.* 5*s.*, without food or cottage.

A balance, with rent and taxes added, does not show a large profit in any year, and in some years there has been a loss; but it is a triumph of agricultural skill and persevering industry to effect so much with such poor material. The chief features on the farm were the management of grass-land, which in May looked remarkably well; the cows, which were small, but very suitable for the land; and the cheese-making, which has been described in the report of a previous competition. This was the only cheese-making farm that came under the inspection of the Judges. Probably there was no other in which the tenant was more handicapped by the land with which he had to deal. The small portion of light land on the farm is an alleviation, but the greater part consists of that sticky clay which has engulfed a melancholy amount of farmers' money during the past decade. The more credit is therefore due to Mr. Milner for his pluck and persistence.

*Asfordly Farm, Melton Mowbray, Leicestershire, occupied by
Mr. Henry Morris.*

This farm also was highly commended. It is 57 acres in extent, 26 acres being arable and 31 (less the buildings and garden) grass-land. The owner is Mrs. Newcome, of 8 Grange Terrace, Weymouth, and it is held on a yearly tenure under the Agricultural Holdings Act, at a rent of 13*l.* a year. It is tithe-free, but there are 13*l.* 18*s.* 10½*d.* of rates and taxes. During the last three years there has been a reduction of 15*l.* on the rent.

The soil is rich loam, the arable land being on gravel and the grass on clay. It is a district of small estates, and farms range from 25 to 250 acres. Besides Asfordly Mr. Morris has 57½ acres and 36 acres under two other landlords in the same parish, besides 100 acres of grass at Saxelby, where he resides.

Asfordly is a village with 559 inhabitants, within a mile of a railway station, and three miles from Melton Mowbray, the metropolis of fox-hunting and pork-pie manufacture. The buildings are comparatively new, and suitable for the wants of the farm.

At first sight the Judges were not very favourably impressed with the general aspect of the place. There appeared to be a lack of tidiness, and nothing in the management seemed to call for special commendation. Ploughed land was clean, but not more so than many farms of ordinary merit. Grass-land was well managed. Swedes were small and seeds rather thin. At the date of the second inspection a great improvement

was observable. The ploughed land had a very creditable appearance, and the crops generally were looking well.

In December there were 3 working horses and 3 foals. Cattle, 52 in number, were all fairly good. Sheep, which numbered 82 in December, were cross-bred between Lincolns and Hampshires, very good, but rather small in size.

The labour bill amounted to 103*l.* 17*s.* 6*d.* yearly. Wages for ordinary labourers are 13*s.* 6*d.* per week; the foreman has a cottage and garden rent free, and 17*s.* weekly.

The leading feature of this farm was the cattle, which were good in character. They were fed off on the grass without any cake, and from this it will be at once obvious that the grass-land was of high quality.

Of grain, the yield is usually 46 bushels of barley, 64 bushels of oats, and of clover, hay, or seeds 35 cwt. per acre.

At his Saxelby farm, where he resides, and which is partly a dairy farm, Mr. Morris is largely engaged in Stilton-cheese-making, the average of the last three years amounting to above 740*l.* a year, from the milk of between 40 and 50 cows, and at all the leading Shows he has been awarded prizes for the superior quality of his cheese.

CONCLUSION.

It need scarcely be said that it was not only upon the farms which have been described in the foregoing pages that features calling for admiration were found. The awards speak for themselves, and record the opinion of the Judges on a comparison of the general merits of each; but there were upon the un-noticed farms, in some cases, special points which, did space permit, might have been dwelt upon. It may, however, be mentioned in general terms that in Class 2 Mr. Henry Potter and Mr. Thomas Hollely were both farming light sandy land of poor character with very great credit. In Class 3 Mr. Arthur Milner, junior, deserves mention, as we found him very energetic in making improvements of a permanent character on his farm, and also farming his land in a manner that deserved success; the fact that he had only occupied his farm for three years had the effect of handicapping him somewhat in the competition.

In concluding these notes, it only remains for the Reporting Judge, on his own behalf and on that of his colleagues, to express their appreciation of the kindness and hospitality with which they were everywhere received, and their recognition of the cheerful alacrity with which the information which it was their duty to collect was placed before them. The readiness with

which all enquiries were answered tended to lighten their labours, and the courtesy with which they were invariably met helped to make those labours pleasant.

IV.—*Report on the Miscellaneous Implements Exhibited at the Nottingham Meeting.* By DAN. PIDGEON, Assoc.Inst.C.E., Reporting Judge.

Judges.

THOMAS BELL, Hedley Hall, Marley Hill, Newcastle-on-Tyne.

J. W. KIMBER, Fyfield Wick, Abingdon.

DAN. PIDGEON, Holmwood, Putney Hill, S.W.

THE Show of Implements at Nottingham was characterised by one very agreeable feature. Although the entries were more numerous by a thousand than in 1887, the arrangement of machinery into various classes was so perfect, and the implements themselves so representative, that it was easier than usual to take in the display as a whole, and to find what was wanted without trouble. A new plan adopted by the Secretary of separately cataloguing such implements as were entered as novelties proved very convenient, and was much appreciated by the Judges.

As anticipated in the report on the implements at Newcastle, the makers have returned to their old habits, and the entries included, not, indeed, as many implements as in earlier days, but enough to make a thoroughly typical display. A few words dropped from one of the competitors in the trials of hay and straw presses illustrates how little makers can afford to be absent from the Royal Agricultural Society's Shows, and how much they sometimes gain by their presence. "I have learned more about how to make a hay-press during these trials than I could possibly have done in any other way." So spoke a hay-press maker, at sea as to principles, like so many others, in this new branch of industry.

The number of entries for the Society's silver medals was unusually large. Sixty-nine implements of various kinds put in an appearance; but, of these, some twenty only were considered by the Judges worthy either of description or reward.

These may conveniently be grouped together under the following headings:—

- I. Articles to which Silver Medals were awarded.
- II. Dairy Implements.
- III. Steam Diggers.
- IV. Miscellaneous Implements.

I. SILVER MEDALS.

As in former years, the Society offered ten silver medals, the award of which Judges could recommend only "in cases of sufficient merit in new implements for agricultural or estate purposes."

It is a pity that some implement makers persuade themselves that unimportant changes in matters of detail constitute novelty such as that which the Society seeks to encourage by its silver medals. To put a $\frac{1}{2}$ " bolt, so to speak, where a $\frac{5}{8}$ " bolt has been used before may, without unfairness, be said to constitute what some of these gentlemen consider a novelty. A little more consideration as to what the Society really intends by its offers of medals would save Judges much trouble, and these exhibitors disappointment.

The Nottingham Show was, however, characterised by the appearance of several real novelties, not, perhaps, very closely allied to, but still touching indirectly, the interests of agriculture. Of these, two received silver medals; a third, had it been more strictly agricultural in character, would have deserved similar recognition; while the fourth, a dairy implement, received a silver medal.

The three medals were awarded as follows:—

THYSS, LOCKYER, & Co., of 37-1 Euston Road, London, N.W., for their "Jersey Creamer" (Art. 917).

PRIESTMAN BROTHERS, of Hull, for their Petroleum Engine, 4-horse power (Art. 3603).

WHITMORE & BINYON, of Wickham Market, for their Midlings Purifier, Weis's Patent (Art. 3885).

The "Jersey Creamer" (Art. 917), exhibited by Messrs. Thyss, Lockyer, & Co., was described and figured in the last number of the Journal, and was recommended on that occasion for further trial at Nottingham.

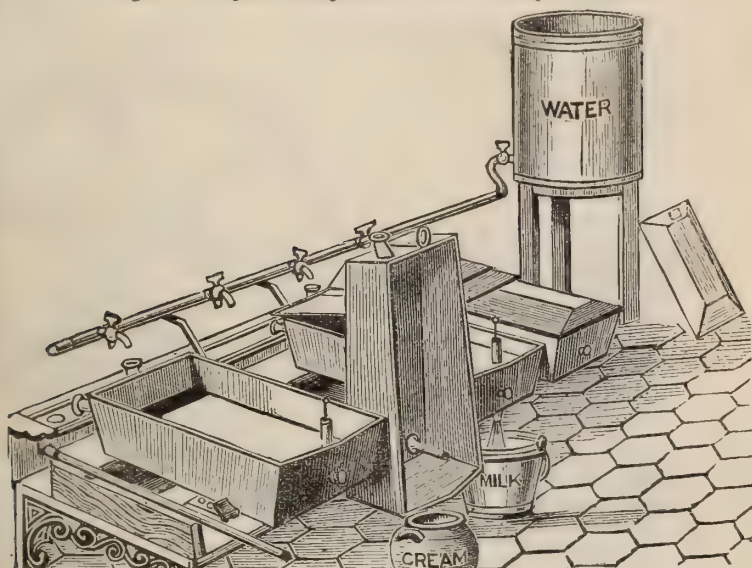
The creamer consists of a group of four shallow tin vessels, each surrounded by a jacket, also of tin, and provided with japanned tin ventilating covers to prevent the access of dust. After the pans are filled with milk, warm water is allowed to flow through the jackets, until the milk has reached a temperature of 110° Fahr. The hot water is then shut off, and a circulation of cold water takes its place. By this means a quickly-falling temperature is produced, under which, as is well known, cream will rise more rapidly than is the case with the ordinary way of setting. Each pan is fitted with a tube whose lower end is closed by fine wire gauze, through which the skim-milk alone passes on withdrawal of a plug carried on a wire, leaving the cream in the pan, whence it is removed by tilting the creamer.

The implement was charged on Wednesday evening, July 11, with thirty-eight quarts of new milk, freshly drawn from cows

in the yard, and was emptied at ten o'clock on the following morning. Twelve pounds of cream and eighty-four pounds of skim-milk resulted. The cream was churned at a temperature of 60° Fahr., and produced 3 lbs. 14 oz. of butter in 17 minutes. The butter-milk remaining in the churn weighed 2 $\frac{3}{4}$ lbs.

This experiment elicited the fact that a much larger quantity of butter-milk remains incorporated with butter than had been supposed to be the case by the experts of the working dairy. The cream put into the churn weighed 12 lbs. All the butter-milk that could be got out was carefully drawn off, and weighed

Fig. 1.—Thyss, Lockyer, & Co.'s "Jersey Creamer."



2 lbs. 12 oz. The weight of butter after washing was 3 lbs. 14 oz., and the total weight of butter and butter-milk therefore was 6 lbs. 10 oz., or only 55 per cent. of the weight of cream placed in the churn; leaving 45 per cent. of the cream unaccounted for. The following is Dr. Voelcker's analysis of the skim-milk obtained from the "Jersey Creamer":—

Water	:	:	:	:	:	:	:	:	:	90.34
Butter-fat	:	:	:	:	:	:	:	:	:	.77
Milk-sugar, casein, &c.	:	:	:	:	:	:	:	:	:	8.12
Mineral matter (ash)	:	:	:	:	:	:	:	:	:	.77

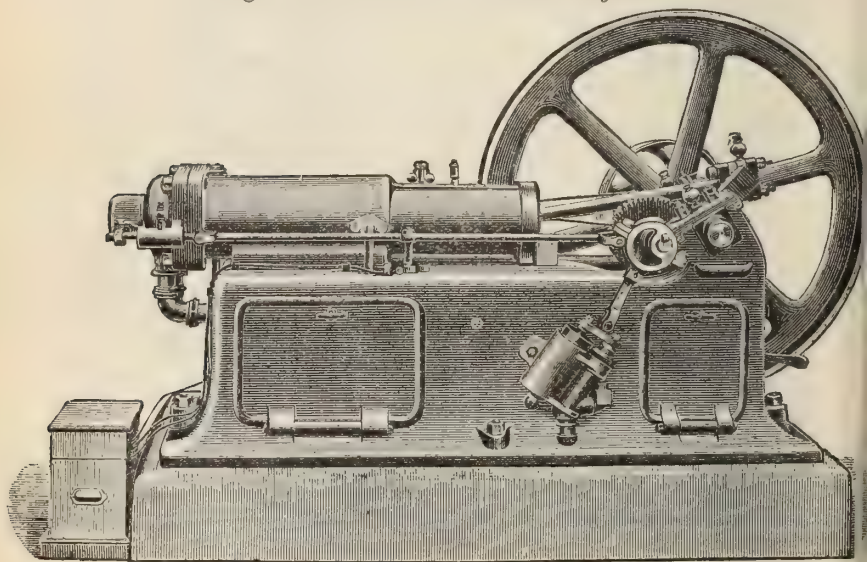
100.00

Specific gravity at 60° Fahr. 1.0345

The "Jersey Creamer" does not, of course, separate cream from milk so quickly or completely as the mechanical cream-separator; but since, in the opinion of the Judges, this device represents a considerable advance upon the ordinary system of milk-setting, and is applicable in cases where the use of separators is out of the question, and more especially for small dairies, where the milk of a few cows only has to be dealt with, it was judged worthy of a silver medal.

Priestman Brothers, Hull, exhibited a petroleum engine (Art. No. 3603), which was driven by ordinary paraffin oil, such as is used for lighting purposes all over the world.

Fig. 2.—*Priestman's Petroleum Engine.*



Many engines have been designed to use the lighter products of petroleum distillation, such as benzine, benzoline, &c., but these have always laboured under the disadvantage of employing a fluid which the fire insurance offices will not allow to be stored on premises covered by their policies. Such an engine (Spiel's) was shown at Newcastle in 1887, but was not allowed to work in the yard, and refused a trial by the Society's engineer, on account of the highly volatile nature of the fluid employed in it.

Messrs. Priestman Brothers themselves, it appears, began by experimenting with the "Etève" Engine, a motor of the same

type as Spiel's, and it was only after they had practically perfected this machine that they discovered its commercial valuelessness. The lesson, however, was not lost, and they have now succeeded in doing with common petroleum all that they were previously able to accomplish with a more volatile fluid.

For the engine of Messrs. Priestman the ordinary kerosine or rock oil is used, which, having a flashing point of from 75° up to 150° Fahr., is free from the objections that attach to "petroleum" as defined in the Petroleum Act of 1879—i.e. with a flashing point of less than 73° Fahr. (as to which alone Local Authorities have the power to enforce regulations). The distinction between the two classes of motors, petroleum oil motors and petroleum spirit motors, which are together included in the generic term "petroleum engine," is important to be observed. Mr. Boverton Redwood, the acknowledged authority on the subject, observes in a recent memorandum that "the two liquids thus employed differ essentially in regard to inflammability; petroleum spirit taking fire readily at common temperatures, while petroleum oil requires to be heated to about 120° Fahr., or higher, before it will ignite. . . . Petroleum oil is commonly known in the trade as "petroleum," while the more volatile product is commercially designated in this country 'petroleum spirit' or 'benzoline.'"

The cycle of operations in the Petroleum Engine is much the same as that of the well-known "Otto" Gas Engine, there being one explosion of mingled oil and air in the cylinder for every two revolutions.

A pump at the side of the engine forces air into an oil-reservoir, at a pressure of a few pounds per square inch. The compressed air, escaping from a small jet, carries with it oil, in the form of very fine spray, which, first, issues into a jacketed chamber heated by the Exhaust, consisting of the products of combustion. The mingled air and oil is there raised to a temperature of about 300° , and then drawn, with more air, into the cylinder, where, after being compressed by the return stroke of the piston, it is exploded. Firing is accomplished by the electric spark, and, at the end of the working stroke, the exhaust valve opens and the products of combustion are discharged into the air. The speed of the engine is regulated by a governor which controls both the flow of oil and the amount of atmospheric air which is mixed with it.

The *crux* of the oil-engine is how to obtain perfect combustion, failing which the cylinder is soon fouled by a deposition of soot. It would be difficult without illustration, and indeed hardly fair to the inventors, minutely to describe the clever devices which, after a long series of experiments, have been adopted by them for the purpose of mixing air and oil in predetermined proportions. Suffice it to say, these are beautiful examples of ingenuity and perseverance applied to the solution of a problem of unusual difficulty.

Such objections as might be taken to the use of the electric spark, with its attendant battery and coil, for the ignition of the charge have been reduced, as far as possible, by the use of apparatus of the simplest type. The battery can be charged by any man of ordinary intelligence, while the terminals between which the spark passes are readily accessible and easily cleaned.

A brake trial of this engine was made by the Society's engineer, the consumption of petroleum being, meanwhile, determined by direct measurement. The speed of the engine and the needle of the spring balance were observed every five minutes. The petroleum was carefully measured by noting the height of the oil in the supply reservoir at the time that the engine started, and weighing back, after the run, the quantity of oil required to bring the new oil-level back to its original place.

The engine ran rather irregularly, the speed varying, within very short periods of time, from 150 to 180 revolutions per minute, while the explosive mixture occasionally missed fire. The exhaust-pipe from the cylinder was hot enough to char wood, but the products of combustion finally discharged into the air did not exhibit a temperature of more than 100°. The heat disappearing between the cylinder and exit pipe was used in raising the temperature of the heating-chamber. A piece of white paper held over the mouth of the exhaust-pipe was spattered with spray of petroleum in a manner to show that some oil escaped unconsumed.

Results of Trial.

Duration of trial	2 hours
Mean number of revolutions per minute	165.5
Mean effective load on brake wheel	56.33 lbs.
Effective diameter of brake wheel	5 feet
Brake-horse-power	4.48
Petroleum consumed in 2 hours	15.5 lbs.
Petroleum consumed per brake H.P. per hour	1.73 lbs.

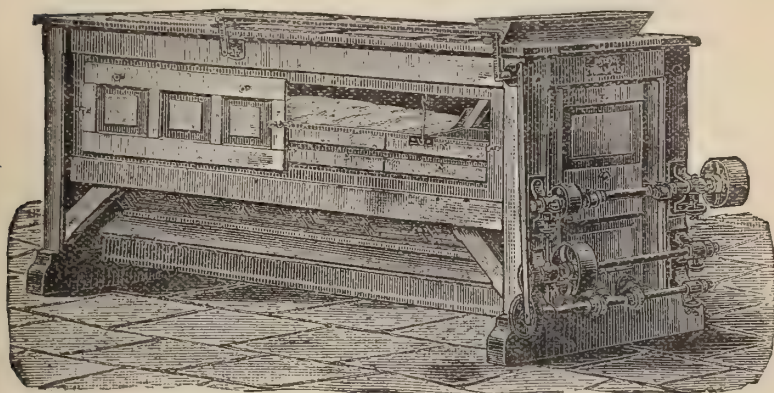
The price of petroleum being calculated at $6\frac{1}{2}d.$ per gallon, the above represents a cost of, say, $1\frac{1}{2}d.$ per horse-power per hour. A steam engine of the same size would not consume less than 7 lbs. of coal per brake-horse-power per hour, which, at 15s. per ton, would be, say, $\frac{1}{2}d.$ per brake-horse-power per hour.

The Middlings Purifier (Art. 3885), exhibited by *Messrs. Whitmore & Binyon*, of Wickham Market, is a new apparatus invented by Mr. Emil Weis. One of the most important machines made use of in connection with roller-milling, now in such common use, is the Middlings Purifier. By its means, the semolinas, which it is the object of gradual reduction to produce, are freed from the small particles mixed up with them, and are

themselves separated, according to their densities, into lighter and heavier samples. No sifting can accomplish this, because the middlings and the bran are often of the same sizes, although differing in specific gravity.

The work is usually done by a combination of silk riddles, and a current of air, produced by an exhausting fan. The former are given a downward beat by the action of a pair of cams, which, compressing rubber springs at the corners of the riddle frame, cause the riddles to rise and strike against a stationary buffer, the sudden stopping of the sieves throwing the middlings into suspension, and enabling the exhaust to act with the greatest effect upon them. The air current, which sweeps upwards through the silks, carries the lightest particles

Fig. 3.—Emil Weis' Patent Middlings Purifier.



away altogether, but is not powerful enough to prevent the heavy granules of semolina from falling through the riddles.

In the machine recently invented by Mr. Emil Weis, the exhaust fan is abolished altogether, and the necessary current of air is produced by a loose, air-tight cloth covering the riddles, one end of which is kept in undulating motion by means of a crank. A current of air thus obtained produces effects altogether superior to anything which can be accomplished by means of a fan-blast. The "middlings" grade themselves accurately according to their specific gravity, and fall purified into the compartments destined for their reception; while the light stuffs, bran and germ, are held suspended and driven over the tail. The machine works without fan or stove-room, which latter is necessary whenever a fan is used, thereby reducing the risk of explosion and fire to a minimum, and avoiding all waste.

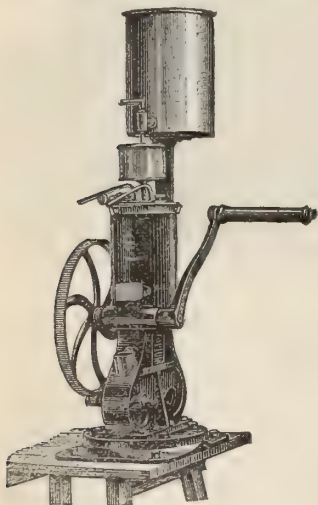
This is probably one of the most important improvements recently introduced into the accessory apparatus of a roller-mill, and as such, although only indirectly connected with agriculture proper, was considered by the Judges deserving of a silver medal.

II. DAIRY IMPLEMENTS.

(a) Cream Separators.

It is unfortunate, either that the Newcastle trials of hand-power separators did not come a little later in time, or the separators shown at Nottingham a little earlier, for the latter constitute a marked advance upon the former machines. Whether or not the competitive trials of 1887 led makers to realise in what points their machines were defective, and how they could be improved, it is difficult to say, but it is certain that all the hand-power separators shown at Nottingham were within the power of a lad, while none of those competing at Newcastle were so.

Fig. 4.—The “Danish” Cream Separator for Hand Power.



The *Aylesbury Dairy Company*, of St. Petersburg Place, W., showed, amongst other things, a “Danish” cream-separator for hand power (Art. 722) (see fig. 4), which differs in nothing but its size and driving gear from the ordinary “Danish” separator. It separates fifteen gallons per hour when the handle is turned at forty revolutions per minute, giving 6,000 revolutions to the milk drum, and is suitable for a dairy of from two to ten cows.

The *Dairy Supply Company*, of Museum Street, London, W.C., exhibited a cream separator for hand-power (Art. 590). This Company showed, at Newcastle, a horizontal form of the well-known “Laval” separator, ar-

anged for hand power, which they have now supplemented by a smaller machine, called the “Baby” (fig. 5, p. 99), wherein the milk vessel again assumes the vertical position. The “Baby” exhibits a decided advance upon the Newcastle machine, so far as its adaptation to hand power is concerned. As regards separation, the machine remains a true “Laval,” has a capacity of twelve gallons per hour, is within the power of a lad to work,

and is well suited to the requirements of a small dairy of from two to ten cows.

Freeth & Pocock, of Victoria Works, Vauxhall, S.W., showed their "Victoria" Cream Separator (Art. No. 645) (fig. 6), a machine built on the "Laval" principle, but possessing certain features of novelty.

Fig. 5.—*The "Baby" Cream Separator.*

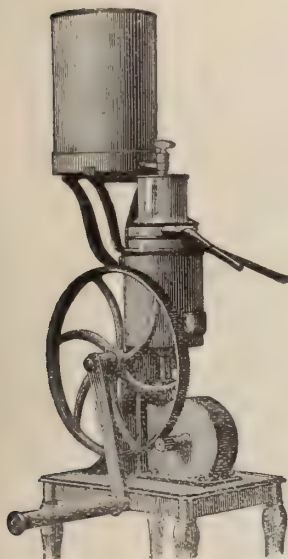
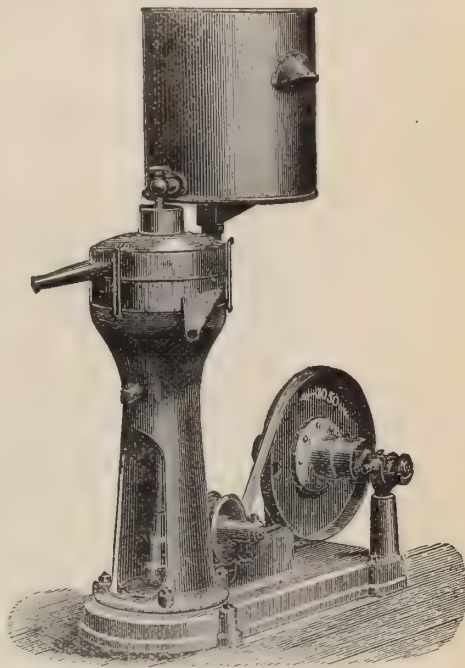


Fig. 6.—*The "Victoria" Cream Separator.*



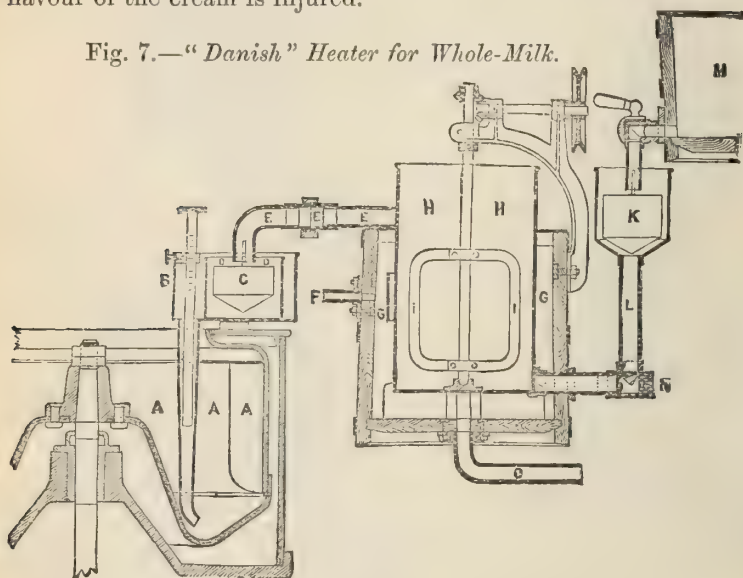
The milk-drum is open at both ends, and can be removed from the machine for the purpose of cleansing; it also empties itself when the machine is stopped. The milk-tank is supported from the body of the separator. The counter-shaft is self-contained, being carried on bearings which form part of the sole plate. The entire machine is very snug and compact, taking up little floor space, and requiring little fixing.

There was a finish about the design and arrangement of this Separator which was very taking, and the machine, which was used throughout the Show in the Working Dairy, attracted the favourable notice of the Judges because of its smooth and effective action.

(b) Other Dairy Appliances.

The Aylesbury Dairy Company showed two "Danish" milk heaters, one (Art. 723) for whole-milk, the other (Art. 722) for skim-milk. The heater for whole-milk is designed for raising the temperature of the milk before it is allowed to run into the separator. The "Danish" separator skims cold as effectually as warm milk, but, in order that separation may proceed at the maximum speed, it is desirable that the milk shall enter the separator at a temperature of about 77° . If over-heated the flavour of the cream is injured.

Fig. 7.—"Danish" Heater for Whole-Milk.

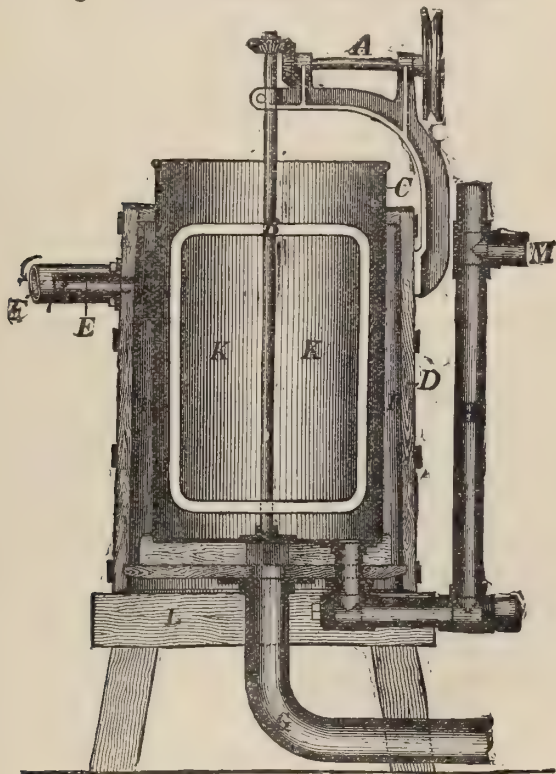


The heater consists of a tinned-copper drum, fitted with a revolving stirrer, and suspended, steam-tight, in a wooden cask. The cask has an inlet and an outlet for steam, and forms a steam jacket. The whole is placed between the milk-tank and the separator, and the inflow and outflow of milk are regulated by the floats K and C shown in the drawing. The stirrer having been set in motion, and the cock of the tank opened, the milk enters the copper drum, and is set in motion by the stirrer. When the drum is full of milk, steam is turned on, and the warm milk, leaving the drum through the spout E, is conducted through the inflow regulator, B, into the separator.

Should the inflow exceed what is required, the float C cuts off the supply from the heater, causing the milk to rise in the latter and in the pipe L, thus operating on the float K, and shutting off the supply coming from the milk-tanks until the level of the milk in the drum is reduced. Only the exact quantity of milk required to feed the separator is thus allowed to enter the heater; and, since this quantity remains constant at a given adjustment of the inflow regulator, B, it is easy to adjust the amount of steam required to heat the milk to the desired temperature,

The "Danish" skim-milk heater has been brought out to overcome the difficulty of keeping skim milk sweet for some hours after separation. Heaters have been used for this purpose, but with only partial success, owing to the solids of the milk coagulating and forming a non-conducting coating on the heating surface of the apparatus. In the machine in question, a stirrer is introduced, which, by agitating the milk, avoids all danger of burning the milk.

Fig. 8.—The "Danish" Skim-milk Heater.



The drawing explains itself; the apparatus is similar to that described on page 100, and may be applied to the milk discharge from a separator, much in the same way as the "Danish" whole-milk heater is applied to the milk-tank. The milk should leave the drum at a temperature of at least 167° Fahr., which is sufficient to insure its keeping for several hours.

The "Blanchard" Butter Worker (Art. No. 593), showed by the Dairy Supply Company, of Museum Street, W.C., consists of

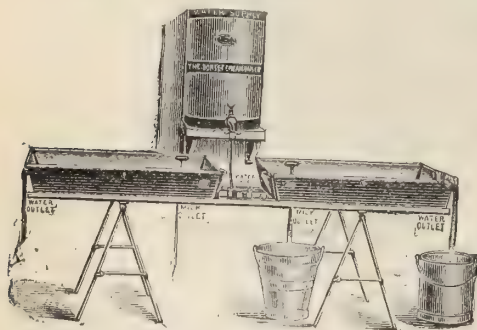
a pair of large wooden rollers, through which, after receiving a powerful pressure, the butter passes, downward, in a sheet about half an inch thick, and is left in convolutions on the shelf below, like a piece of cloth when it leaves the loom. These folds are pressed together as the butter passes through the worker a second time, producing a thorough intermixture of all parts of the mass. After three or four such passages, the operation is completed, and the only limit to the capacity of this butter worker is the number of pounds the operator can handle. The machine is intended for factory purposes, and it is claimed that it can operate upon 500 lbs. of butter in twenty minutes.

Messrs. Freeth & Pocock, of Wandsworth Road, S.W., showed a simple centrifugal milk and butter tester (Art. 646), which, though not itself novel, was interesting by reason of its application to the testing of butter.

Butter was melted and poured into a graduated test-tube, which was then rapidly spun in the machine. At the end of a minute, a separation was effected between the salt, the water, the butter-fat, and the casein contained in the butter, and the percentage of each ingredient was read off from the graduated tube. It was claimed that the test is all that is required for commercial purposes, but the Judges had no means of ascertaining whether this were so or not.

Messrs. Pond & Son, of Blandford, Dorset, exhibited their "Dorset" Cream Raiser (Art. 478), which is similar in all essential

Fig. 9.—Pond's "Dorset" Creamer.



respects to the "Jersey" creamer (described on page 93), save in the fact that one large pan is used instead of four smaller ones.

Both implements were tried simultaneously, each receiving a similar charge, with the result that the "Dorset" creamer produced $10\frac{1}{4}$ lbs. of

cream and $83\frac{3}{4}$ lbs. of skim-milk. The cream was churned at a temperature of 60° , butter coming in 16 minutes. A total of 3 lbs. $10\frac{3}{4}$ oz. of butter and $3\frac{1}{4}$ lbs. of butter-milk was produced. The same remarks with regard to the percentage of loss occurring in the process of butter-making applies to this as to the "Jersey" creamer (see page 93). The "Dorset"

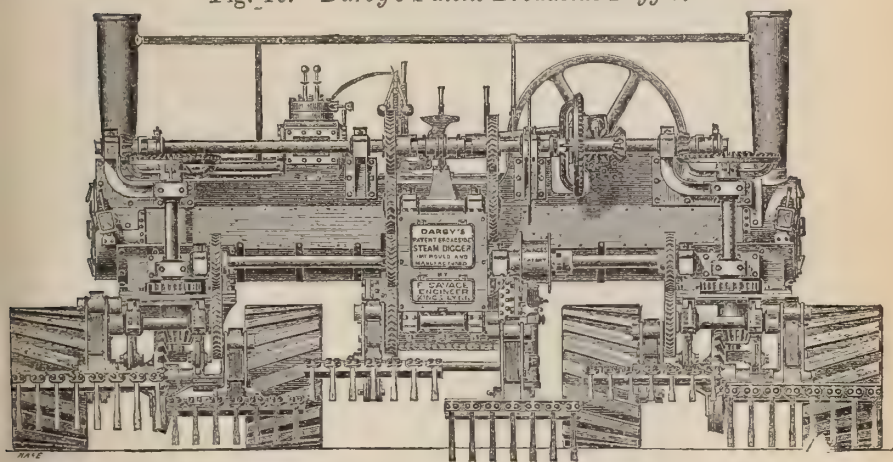
creamer proved inferior both in its results and in the time taken to empty the vessel, and it appears that small pans are preferable in practice to large pans. The following is Dr. Voelcker's analysis of the skim-milk obtained from the "Dorset" cream raiser:—

Water	90 27
Butter-fat	72
Milk-sugar, casein, &c.	8 27
Mineral matter (ash)	74
	<hr/>
	100 00
Specific gravity at 60° Fahr.	1 0350

III. STEAM DIGGERS.

Darby's Patent Broadside Digger (Art. 3871), exhibited by Messrs. Darby & Savage, of King's Lynn, Norfolk. This well-known implement, to which a silver medal was awarded at

Fig. 10.—Darby's Patent Broadside Digger.



Carlisle,¹ and whose performance was then recorded at considerable length in the Journal, was allowed to be shown as a new implement, a considerable number of important, if not vital, improvements having, since then, been made in the details of its construction. This implement has been so often described that it will only be necessary to touch, here, upon the changes in question. The most important of these are as follows:—

¹ Journal, Vol. XVI., Second Series, p. 665.

1. Six digging-forks are now used instead of three, thus halving the width of the spit, which was 7 feet, and is now 3 feet 6 inches.
2. Adjusting the depth of the spit from $6\frac{1}{4}$ to $9\frac{1}{4}$ inches, according to the work to be done.
3. Placing the crank over instead of under the rocking-arm as before, thus giving, it is claimed, a better entry for the digging-forks, and a better lift of soil.
4. Making the length of the rocking-arm adjustable for the purpose of giving a more vertical entry in soft, and a more inclined entry in hard soil.
5. Arranging the forks so as to turn up like those of a haymaker, in order to facilitate backing in the field, and travelling on the road.
6. The abolition of numerous universal joints, through which the digging-tines were originally driven, and the substitution for this purpose of a continuous shaft.
7. A new means of operating the four driving-wheels, whereby they can be turned around their respective vertical axes, whether the engine is travelling or digging.
8. Bringing the whole machine, whether digging or travelling, under the control of a single man.
9. The introduction of a hydraulic jack, to take the weight of the engine off the wheels while these are being revolved around their vertical axes.

Although this machine was entered as a novelty, and a claimant for a silver medal, the Judges felt it impossible to make an award which would put the stamp of the Society upon such an important implement without careful and complete trial. The same remark applies to Proctor's digger, which was also exhibited at Nottingham. Nor was this conclusion come to without due consideration on the part of all five Judges, assisted in their deliberations by the Engineer of the Society.

Both diggers were shown at work during the Show week, and inspected by Mr. Anderson, who took such notes of these performances as were possible without an exhaustive trial. Mr. Anderson reports upon Darby's digger as follows:—

As far as I could see, all the mechanical difficulties connected with this implement have been overcome. It worked very well, digging furrows about 6 inches deep and $6\frac{1}{4}$ inches and $9\frac{1}{4}$ inches wide. The width cultivated was 21 feet, and the rate of advance about 112 feet in five minutes, or 1,344 feet per hour. This would make .65 acre per hour, or from 6 to 7 acres per day of ten hours, which agrees with the estimate given me by Mr. Darby. It took three minutes to turn at the headlands. I was informed that a water-cart, holding about 108 gallons, would serve for one and a half acres. This would be at the rate of 72 gallons per acre, and, as .65 acre is dug in an hour, the water consumption would be about 46.8 gallons, or 46.8 lbs. per hour. An engine having only a $9\frac{1}{2}$ -inch cylinder would hardly consume less than 40 lbs. of steam per indicated horsepower per hour. This would make the indicated power 11.7, which seems very little; but the engine appeared to do its work without effort.

It takes about three-quarters of an hour to get the machine altered for travelling along roads, but the conditions under which the change was made were not favourable, as there were not less than three masters present, all giving orders and bewildering the men. It should be noted that the boiler is very long, about 17 feet; and though the fire-box is in the middle, it seemed

to me that there might be danger of exposing the tubes, at any rate when working on sidelong ground.

I was told that seven of the old, and two of the new type of diggers are working successfully, and that 15s. an acre is readily paid for digging, against 10s. for ploughing and cross-cultivation. I had no means of verifying this statement.

Messrs. Charles Burrell & Son, Thetford, Norfolk, showed a 5 h.p. Steam Digger, Proctor's Patent (Art. 3668).

In this machine, contrary to the practice in Darby's digger, the forks are placed in the rear of the engine, and consist of three sets of tines, six in a set. They are actuated by

Fig. 11.—*Proctor's Steam Digger.*



a three-throw crank shaft, thrown into gear with the engine by means of an eccentric spindle. The arm to which the digging-tines are attached is driven, above, by the crank, and supported below the crank by a rocking or radius bar. A little to the rear of the main road-wheels of the traction engine, is a central wheel, or roller, capable of being raised or lowered by means of convenient hand-gear, so as to bear upon the surface of the field, should this be too soft to carry the weight of the implement upon the driving-wheels only.

The cylinder of the engine is $6\frac{1}{4}$ inches diameter, and 9-inch stroke; the nominal horse-power is 5, and the boiler pressure 125 lbs. to the square inch. The total weight is $7\frac{1}{2}$ tons, towards which the digging apparatus contributes about 17 cwt. The tines are of steel, $12\frac{1}{2}$ inches long, having chisel points $1\frac{5}{8}$ inch wide.

The inventor stated that his 5-horse implement could dig $3\frac{1}{2}$ acres, 6 inches deep, in furrows 10 inches wide, in a day of eight hours. An 8-horse implement was working during the Show in a field where ryegrass had just been cut. The soil was light and loamy, the machine dug about eighty spits a minute, each 10 inches wide, and from 4 to 6 inches deep. These were pushed aside about 2 feet, and, for the most part, the work was very well done. Misses, however, often occurred, when the furrow was not turned over, but only shifted from its original position.

The inventor stated that this 8-horse implement would dig 8 acres per day of eight hours, 11 inches deep; and would consume $9\frac{1}{2}$ cwt. of coal per day—a duty equal to that of a double

set of plough-tackle of 14-horse power—which, if correct, gives a good idea of the probable difference in cost, both as to capital and daily expenditure in the two systems.

The engine was easily run backwards over the headland right up to the fence, and commenced digging from that point. It was also set to dig across that portion of the ground which had already been disturbed, and this it accomplished without difficulty, the land roller, previously alluded to, helping materially to support the weight of the implement.

It must be said that the agricultural Judges spoke a little doubtfully about the condition in which the soil was left by both these machines, as compared with the plough, on cloverley or old seeds; but, supposing the work, generally, can be done in a satisfactory manner from the agricultural point of view, the Digger may form a valuable farm implement, more handy to use, more economical to work, and cheaper in first cost than a double-engine ploughing set. It is a case in which, looking at the importance of the question, and the advance which has been made since steam-digging was first advocated, a thoroughly exhaustive trial, in which the Digger is pitted against steam tackle, might yield fruitful results.

IV. MISCELLANEOUS IMPLEMENTS.

(Arranged in Order of Implement Catalogue.)

Messrs. Picksley, Sims, & Co., of Bedford Foundry, Leigh, Lancashire, showed a Potato Raiser (Art. 533), which is a new implement, not as yet tried, designed for the purpose of digging and screening potatoes. It consists of a revolving screen of tapering form, about 2 feet in its larger and 1 foot in its smaller diameter, and 3 feet long, made of a single wire about $\frac{3}{8}$ inch diameter wound spirally throughout the length of the screen. The mesh of the wire is close enough to prevent potatoes from falling through, while it is open enough to allow of the soil escaping.

The lower and larger end of the screen is armed with half a dozen digging blades, which can be raised and lowered by means of a lever, so as to penetrate more or less deeply into the soil. The potatoes, as they are unearthed by the blades, are taken charge of by a peripheral "Archimedean" screw, running, internally, from end to end of the revolving screen, and serving to discharge the tubers from its smaller end into a hamper carried on the machine for their reception.

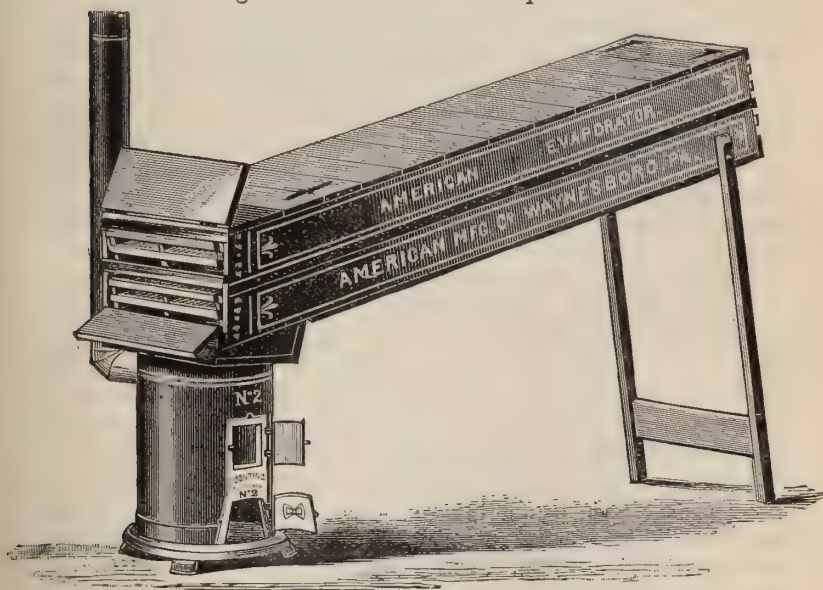
The machine is mounted on four travelling wheels, of which the hinder pair carry all the weight, the front wheels being

used only for turning. Motion is given to the screen by means of chain-wheels and gearing, driven from the main axle of the machine.

Messrs. Robinson & Allen, of Water Street, Liverpool, showed as a new implement (Art. 913) one of the Fruit Evaporators made by the American Manufacturing Company, of Waynesborough, Pennsylvania. This apparatus illustrates a process already in extensive and profitable use in the United States, which ought to be better known if not largely employed in this country. Our farmers, fruit and vegetable growers, often suffer loss, sometimes due to the weather, sometimes to over-supply, which the practice of fruit-evaporation would always mitigate, and sometimes abolish. Meanwhile, their American *confrères* supply the English markets annually with enormous quantities of evaporated fruit, chiefly apples, which sell here, throughout the winter, at prices varying from 45s. to 55s. per cwt.

Rider's patent Evaporator is only one among many similar machines used by farmers in America, and may, or may not be,

Fig. 12.—Rider's Patent Evaporator.



the best of its class. But it deserves consideration from the members of the Society, because, whatever its comparative merits, it points a finger in the direction of progress, and may furnish a most useful hint to English agriculturists.

The apparatus is extremely simple, consisting of a closed iron stove, surrounded by a hot-air jacket, and capped by two inclined wooden flues, through which the heated air from the jacket passes upwards and away into the atmosphere. These flues are furnished with slides, upon which trays of wire netting containing the fruit are placed. The trays, as they are filled, are slid in at the lower end of the flues, one after the other, and the charge remains in the apparatus from three to ten hours, according to the character of the material operated on. Plums and apples are dried, at a temperature of 140° to 190° , in from eight to ten hours, while apple rings, cherries, and the smaller fruit generally, take about four or five hours to dry.

It is claimed that by concentrating the direct heat of the stove upon the charge during the first stage of the process, an artificial skin is developed upon the fruit (just as a quick fire seals the outer surfaces of a roasting joint), which serves to retain the volatile essential oils, giving its distinctive flavour to every fruit. After this cuticle has been formed, the trays are slid gradually upwards, and their remaining moisture driven off more slowly.

The Judges would like to have made some trials of this apparatus, if only with a view of guiding agriculturists in a matter of some importance, but the exhibitor was ill prepared for trial, having no fruit or vegetables handy, and his stove-pipe imperfectly fixed. This failure is, however, less to be regretted in view of the fact that the Society have since offered prizes for Fruit Evaporators, to be competed for at the Windsor Meeting, where, it may be hoped, Rider's apparatus will be again forthcoming.

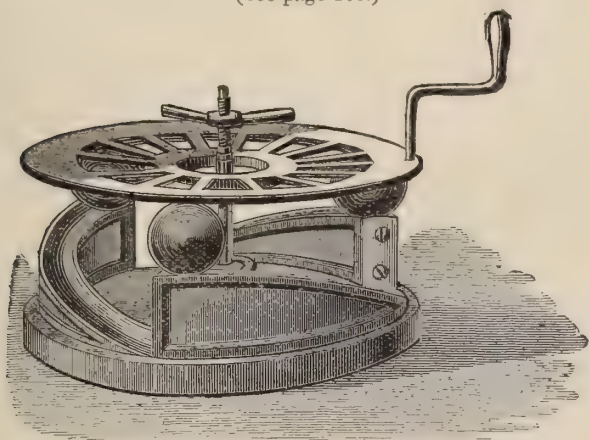
Messrs. J. L. Baker & Co., of Hargrave, near Kimbolton, showed a Sinking Platform (Art. 1454), which is a simple apparatus for the purpose of cooling wheel-tires. The drawing shows at a glance how this operation is accomplished. The wheel-plate proper is supported upon three cast-iron balls, which roll up or down three appropriate inclines: when the handle is pulled round in one direction, the wheel-plate sinks, and when pulled round in the other, it rises. The wheel-plate is kept in position at its highest point by the three balls dropping each into a slight depression formed at the top of the inclines. The water-tank is composed of cast-iron segments, having a bottom of thick elm plank. The whole is very strong, and there is nothing to get out of order even with the roughest usage (see fig. 13, on next page).

Messrs. Garrett & Sons, of Leiston, Suffolk, showed a so-called "Endless Railway" (Art. 1866), patented by Mr. Gillermo

Fender, of Buenos Ayres. This inventor follows, at a long distance of time, somewhat closely in the footsteps of Mr. Boydell, the originator of the famous "Boydell Steam Horse," but he attains the same object by somewhat simpler means. Mr. Fender applies a ring of wide wrought-iron shoes, linked loosely together by ordinary chain, to the wheels of a traction-engine;

Fig. 13.—*Baker's Sinking Platform.*

(See page 108.)



carrying the weight of this arrangement upon a strong wrought-iron frame, which keeps the "Railway" out of touch of the periphery of the driving-wheels. When the engine is at work, the chain of shoes forms a pathway, constantly laid down and taken up again, for the passage of the driving-wheel, which therefore travels along an endless railway.

Mr. Wm. Brenton, of East Cornwall Works, St. Germans, Cornwall, exhibited a new corn and seed drill (Art. 2170) having certain features of novelty and apparent merit.

The seed-deliverer in this implement consists of a roller having a concave surface whose smallest diameter is midway between its two ends. Here are a number of curved teeth adapted to move the grain towards the discharge opening, which is itself provided with an adjustable slide for the purpose of increasing or decreasing the quantity of seed sown. Once in every revolution of the concave seed roller, a brush attached to its circumference cleans the discharge opening, towards which the seed is constantly compelled to fall by the concavity of the feeding roller. Mr. Brenton also showed a mowing-machine fitted with "lock-jaw" fingers, an arrangement which makes it

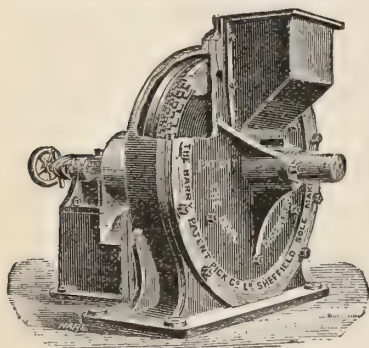
impossible for these to become displaced on the finger bar while the machine is at work.

Mr. T. C. Fawcett, of Whitehouse, Leeds (Art. 3579), showed a Brick and Tile Pressing Machine, in which the toggle-joint, commonly in use in brick presses for squeezing the clay into its mould, is modified, in a very ingenious manner, so as to give a second and heavier pressure to the brick, on the return movement of the toggle. This is accomplished by connecting the moving joints of the toggle by a short link in such a way that its arms, going forward, stand at a slight angle with one another, while on the return stroke they are vertical, or nearly so.

In this way the piston, after its first stroke, is caused to retreat slightly from the surface of the brick in course of pressing, allowing the air between itself and the clay to escape, while it exerts a final, and heavier, pressure upon the return stroke of the toggle. The simplicity and ingenuity of this arrangement are worthy of high praise, while the device ensures a better surface and greater uniformity of thickness in the bricks produced, without the loss of any time in the process.

Mr. Fawcett further showed a new and ingenious method of oiling the surface of bricks in the mould. A small fan, driven from the machine, urges a blast of air through an "aspirator," into which oil is falling drop by drop. A fine spray of the

Fig. 14.—Hardy's Disintegrator.



lubricant is thus produced, which, being evenly distributed over the whole surface of the brick-face, improves its finish, while insuring the perfect release of the piston from the clay on the upward stroke.

The Hardy Patent Pick Company, Sheffield, showed a Disintegrator (Art. 3664), which combines the percussive action of high-speed machines of this kind with a grinding process, progressing step by step, and gradually reducing

the materials dealt with to any desired degree of fineness.

Two cast-iron rings, one fixed and the other revolving, are furnished, on the peripheral surfaces of their respective discs, with chilled teeth, arranged in concentric circles, and interlocking one with the other in the manner shown in the drawing. Here and there, in both rings, a tooth is missing, in order to give access to the material to be acted upon. The teeth are largest

where the material enters, and where, consequently, most strength is required for the first breaking, and decrease in size outwards, the last teeth being small and very numerous. The revolving disc makes from 800 to 1,000 revolutions per minute, and can be set to grind coarse or fine as desired.

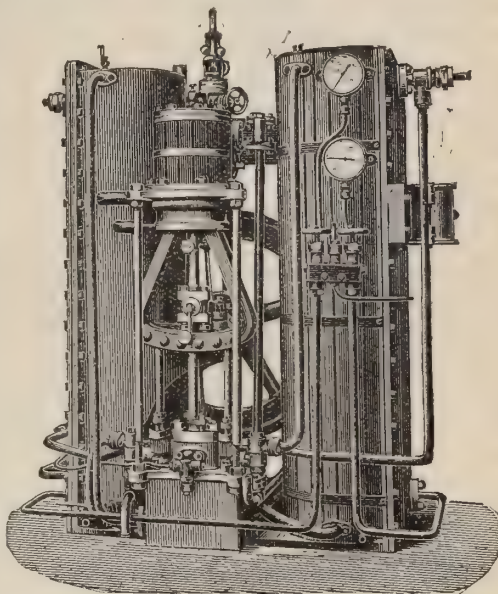
One feature of importance in this machine is that the stuff escapes as soon as the requisite fineness is reached, and is not operated upon again and again as in some disintegrators. The machine grinds almost all kinds of substances, ranging from quartz to rubber, rags, and cork, and it is claimed that it can even deal with plastic substances.

The Judges were of opinion that the output from this machine would be large in proportion to the power employed, while the work in progress, viz. the reduction of green bones, was very well done. This determined them to recommend the machine for trial at the next Meeting of the Society.

Messrs. J. & E. Hall, of Dartford Iron Works, Kent, exhibited a Refrigerating Machine (Art. 3962), which is a new and interesting example illustrative of the growth of science in refrigerating machinery, and would have been entitled to a Silver Medal, whether on account of novelty or merit, but for the fact that it does not come within the class of agricultural machinery defined by the Council as eligible for such distinction.

Hall's refrigerator is based upon the system of compression and liquefaction, through cooling and evaporation, of an anhydrous gas having a low boiling-point. The designer has chosen for this purpose carbonic anhydride, on account of its high latent heat of vaporisation, inodorousness, freedom from chemical action on metals, or the leather used for making joints, and because it is a material cheaply and easily

Fig. 15.—*Hall's Refrigerating Machine.*



procured, while, in the small quantities used in these machines, quite harmless to life or health should any escape occur.

The machine consists of the following parts:—

1. A “refrigerator,” where the carbonic anhydride passes by expansion into the gaseous state, causing, by such expansion, intense cold.

2. A compressing pump, wherein the expanded gas is re-compressed; and

3. A condenser, where the compressed gas is liquefied by cooling water. Besides the gas pump, there are two auxiliary pumps, one supplying the cooling water to the condenser, the other circulating brine in the pipes on the roof of the cold chamber. All three pumps are driven from the same cross-head, and direct from the steam cylinder.

The parts described above are analogous to those used in ammonia, ether, and sulphurous-acid machines, which all work on the principle of compression, liquefaction, and evaporation of gases, but, owing to the larger range of expansion and intense cold produced by carbonic anhydride, the quantity required both of this and cooling water, together with the size of the machine, is much reduced.

The pressure required to liquefy carbonic anhydride is high, but does not exceed that used in ordinary hydraulic machinery, while the compressing pump, pipes, &c., are of such small dimensions that no difficulty is met with in insuring abundance of strength and substantial tightness. In addition, the quantity of carbonic anhydride required to charge the machine is so small that no danger to life or health would arise even if, by some accident, the entire quantity in the machine were thrown suddenly into the engine-room.

The cycle of operation is as follows:—

The machine is charged with CO_2 , condensed into liquid form under a pressure of 50 atmospheres, at a temperature of 58° Fahr. It is at present the custom of the makers to buy this liquid from Germany, at a cost of 6d. per pound.

Escaping from the bottle in which it is confined, the liquid CO_2 expands into a chamber (consisting of a coil of pipe), where it resumes its gaseous form, and is afterwards pumped into the condenser. The act of compression heats the expanded gas, and the heat so formed is carried away by water flowing through a jacket surrounding the condenser.

The compressed gas passes next through a regulating valve in a very fine stream into the refrigerator, which consists of a coil surrounded by brine. The expansion of the gas in the refrigerator cools the surrounding brine down to 20° or 25° Fahr., and the cold brine then circulates through pipes arranged in the usual way upon the ceiling of the cooling chamber.

These engines are made from 1 to 70 horse-power, with a capacity for ice production which varies from $\frac{1}{4}$ cwt. to 2 tons per hour.

The Elastic Steel Horse-Collar Company, of 72 Summer Row, Birmingham, exhibited a steel horse collar (Art. 4594) which con-

stitutes an attempt to replace the ordinary stuffed leather horse-collar with one made entirely of metal.

The collar is composed of two similar halves, with the necessary connections, formed of thin steel plate, of U-shaped section, and provided with a hinge at top which allows of its being opened, while it is shut by means of a spring catch. The collar is easily put on, or taken off, without passing over the head, while its disengagement, when a horse falls, is greatly facilitated. The collar may be described as a hollow pair of hames, enlarged, and fitting the horse's shoulder, while its U-

Fig. 16.—*Elastic Steel Horse Collar.*



shaped section gives it considerable elasticity, and relieves the shocks incidental to sudden and heavy draught.

It is claimed that horses using these collars are less liable to galling than with the leather collar, the lining of which becomes rotted by perspiration and rain, hard on the surface, and consequently apt to produce sores. On the other hand, it is impossible to say, without extended trial, whether these advantages will or will not be realised. Such a trial is, of course, impossible at an agricultural show, but the Judges hope, by

calling attention to this new and apparently meritorious invention, to interest users in making such experiments with it as will determine its value. Exactly similar horse-collars have been used for some years past in America, especially at the "Fire-Stations," where the work is trying, and it is within the writer's personal knowledge that they are there very highly spoken of.

Mr. R. H. Clapham, of Bridge End Works, Darlington, showed Rick Cover Trestles (Art. 4676) which dispense with the upright poles and their accompanying blocks, ropes, stays, &c., ordinarily in use for protecting a hay-rick while in course of building.

Fig. 17.—*Clapham's Rick Cover Trestles.*



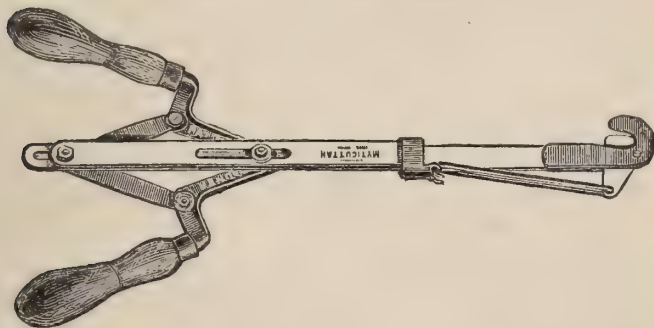
A pair of light, wrought-iron trestles are stuck, by means of spikes, into the surface of any rick in course of construction. Two trestles are sufficient for a moderately sized stack, but more may be used if its dimensions are very large. Each pair of trestles is hinged at the top, the limbs of the hinge being produced so as to form a jaw by which the round pole, usually employed for carrying the sheet, is grasped.

The rick-cloth itself is supported by loose cords, fast at one end to the centre pole and running down between the seams of the cloth, thereby taking all strain off the cover itself, and distributing this equally over the cords. This system gives more

durability to the rick-cloth than is obtainable under the old plan of eyelet holes.

The Standard Manufacturing Company, of Derby, exhibited a number of tree-pruning implements (Arts. 4686 *et seq.*), already well known under the fanciful name of "Myticuttah." Among these was a new form of the tool in question, capable of severing branches $1\frac{1}{2}$ inch in diameter. The cutting blades of an ordinary "Myticuttah" are mounted on an end of a long light spar of wood, and are actuated by a hand lever placed at the lower end of such spar. The arrangement enables a man to prune and trim up to considerable heights without the aid of a ladder, while branches of considerable size can be lopped off with only a small expenditure of energy. The drawing (Fig. 18), shows one of the smaller pruning implements.

Fig. 18.—"The Myticuttah."



The best acknowledgments of the Judges of Miscellaneous Implements are due, and are hereby tendered, to the Stewards of the Society and their Engineer for much valuable assistance promptly and courteously rendered.

V.—*Notes on the Thoroughbred Stallions Exhibited at the Spring Show of Horses held at the Royal Agricultural Hall in February 1889.* By the EARL OF COVENTRY.

THE policy inaugurated by the Royal Agricultural Society in 1887, and continued on a larger scale in 1888 and again in the present year by the Royal Commission on Horse-Breeding, of offering substantial premiums to the owners of thoroughbred stallions on condition that a certain number of half-bred mares are served at low fees, has been so favourably regarded by the

public, and is now so well understood, that it is unnecessary here to say anything concerning it. The only practicable and satisfactory method of choosing the stallions to receive premiums is, at all events for the present, by means of a public competition; and this year the Royal Commission and the Royal Agricultural Society were fortunately able to make arrangements with the Hackney Horse and Hunters' Improvement Societies, by which a joint Show of some 388 horses (thoroughbreds, hunter mares, hackneys, and Yorkshire coach-horses) took place at the Royal Agricultural Hall on February 26, 27, 28, and March 1. Though it is no part of my province to deal with the administration of the Show, I shall be excused for a word of appreciation of the efficiency of the arrangements, and of satisfaction at the unusually good attendance of the public.

I have undertaken to put together for this Journal a few notes as to the thoroughbred stallions competing for the premiums offered by the Royal Commission and by the Royal Agricultural Society. The Judges of the thoroughbreds (who got through their work with commendable expedition) were—

The EARL OF ENNISKILLEN, Florence Court, Enniskillen.
General THORNHILL, Lavender Farm, Ascot, Berkshire.
Mr. J. MAUNSELL RICHARDSON, Healing Manor, Ulceby,
Lincolnshire.

The Veterinary Inspectors, upon whom was laid the duty of examining the soundness of the animals sent out to them by the Judges, were—

Dr. GEORGE FLEMING, C.B., LL.D., F.R.C.V.S., War Office,
Parliament Street, London, S.W.
Mr. ALEXANDER C. COPE, M.R.C.V.S., Agricultural De-
partment, Privy Council Office, 41 Parliament Street,
London, S.W.
Professor COLIN C. BAIRD, M.R.C.V.S., Veterinary College,
Edinburgh.

As the whole question of the diseases which render an animal unfit for stud purposes is about to be considered by the Royal Commission on Horse-Breeding in connection with the report made to them by the Royal College of Veterinary Surgeons, it will not be necessary on the present occasion to do more than reproduce the following report of the Veterinary Inspectors:—

“We have the honour to report that, at the Exhibition of Thoroughbred Stallions held at the Royal Agricultural Hall by the Royal Commission and the Royal Agricultural Society, fifty-one horses were submitted to us

for examination. Of these seventeen failed in our opinion to comply with the conditions required by and named in the certificate as to soundness.

"Of the animals rejected, fifteen were found to be affected with bony deposits (eight spavin, seven ringbone), and two were rejected for diseased feet, combined with lameness. One of the first-named animals had also disease of the eye.

"(Signed) GEORGE FLEMING, F.R.C.V.S.

"(Signed) ALEX. C. COPE, M.R.C.V.S.

"March 2, 1889.

"(Signed) COLIN C. BAIRD, M.R.C.V.S."

At Nottingham last year 64 horses were submitted for examination, of which 34 were rejected as unsound; and the following were the causes of rejection:—Wind, 3; Eyes, 5; Curb, 1; Bony deposits affecting joints (9 spavin, 8 ringbone), 17; Diseased feet, 8.

The following comparative statement of the entries in each District Class at Nottingham last year and at Islington this year will be interesting:—

Entries in					Entries in				
1889					1888				
District Class A	.	.	21	14	District Class II	.	.	3	2
" " B	.	.	6	11	" " I	.	.	3	4
" " C	.	.	7	24	" " J	.	.	3	3
" " D	.	.	13	10	" " K	.	.	2	3
" " E	.	.	11	16					
" " F	.	.	10	11	Total	.	.	90	105
" " G	.	.	11	7					

The considerable diminution in Class C (Nottinghamshire and other counties) is no doubt to a large extent due to the fact that last year the Royal Agricultural Society undertook this district, and offered five premiums of 200*l.* each and gold medals. This year the Society gives the premiums in Class D, and has assimilated its regulations to those of the Royal Commission, so that for the present season there will be three stallions serving in each of the seven English districts under uniform conditions—viz. "That each stallion winning a premium shall serve not less than fifty half-bred mares, if required, during the season of 1889, and shall stand or travel at the owner's option in the district for which he is exhibited, at a fee not exceeding 40*s.* for each mare, and 2*s.* 6*d.* to the groom."

It should also be added, as an explanation of the diminished number of entries, that this year no owner could enter more than one stallion in the same class.

The Show passed off well, and may fairly be described as a success, inasmuch as it denotes steady progress in the quality of the horses exhibited; whilst the attendance of hunting men and others who witnessed the judging was larger than in former

years, and may be taken as an indication of the growing interest felt in the movement throughout the country. Some little dissatisfaction was expressed here and there at the difficulty which was experienced in seeing the horses by those who were unable to attend the parades: and no doubt the boxes were both small and dark as compared with the spacious accommodation provided at the Royal Agricultural Society's Spring Shows at Newcastle and at Nottingham.

In DISTRICT CLASS A there were twenty-one entries, and *Baldur*, *Pedometer*, and *Truefit* were selected for the Queen's premiums; *City Arab*, *Red Willow*, and *Ben Alder* being reserved in the order named. Of these, *Baldur* by Doncaster out of Freia by Hermit is a golden chestnut, six years old, standing over sixteen hands, and it will be remembered that he was placed first at the Royal Show held in July last year at Nottingham. *Baldur* has done well since then, and is now a grand specimen of a thoroughbred horse. He catches his near hind leg in a way which suggests the development of string halt, but he appears to be, and was indeed passed, thoroughly sound. *Pedometer*, a brown horse by King Tom, carries his seventeen years well, and, though dipped in the back, he looks well, and is a handsome, nicely-formed animal. *Truefit*, a chestnut horse by Outfit out of Eleanora by Wild Dayrell, is well-known in the show ring, and generally admired. Standing about sixteen hands, well put together, with plenty of substance, and on short legs, he is undoubtedly a horse of great merit; but there are those who take exception to his feet, which are open to criticism.

City Arab, a bay horse ten years old, about 15 hands 2 inches, by Tibthorpe out of a mare by Peon, is quite a model hunting sire. Compact, wide, perfect in shape, with plenty of substance, he is a little big one, and the only defect which, in my opinion, can fairly be found in him is that he is inclined to be somewhat coarse about his neck, and to lack quality.

In DISTRICT CLASS B six horses were entered, and the three premiums were awarded to *Bluegrass*, *Even*, and *Moss Hawk*, *Linnaeus* being reserve. *Bluegrass*, a nine-year-old chestnut, of a pure American strain of blood, by Pat Molloy out of Amy Farley by Planet, is a horse of size and great quality; his thighs and arms may be somewhat light, but he is a good-looking sire, sure to do well in any district. *Even*, by Quits out of Evelyn II. by Carnival, is a brown horse of nice size, and looks like a hunter. *Moss Hawk*, a chestnut, nine years old, by Blair Athol out of Vergiss-mein-nicht by the Flying Dutchman, shows all the quality one would expect from his dis-

tinguished pedigree. *Innaeus*, a grey, foaled in 1878, by Strathconan out of Sweet Violet by Voltigeur, is a nice-sized, well-put-together horse; some might cavil at his shoulders, but he appears to use them well. He was a premium stallion last year, standing in District E (Yorkshire).

In DISTRICT CLASS C seven horses were entered, but only one was adjudged worthy of a premium. This was *Connaught*, a four-year-old chestnut, by George Frederick out of Duchess of Edinburgh by Blair Athol. He stands about 16 hands, and is a promising young sire, possessing good shoulders, substance, and quality. So young a horse is shown at a disadvantage, but if he furnishes and goes on well he will grow into a valuable animal.

The premiums in DISTRICT CLASS D are offered this year by the Royal Agricultural Society, and the Society's gold medal is given in addition. Thirteen horses were entered, from which *Lancastrian*, *Peppermint*, and *Ruddigore* were chosen for the premiums and medals,¹ with *Eclipse* and *Pearl Diver* reserved in the order named.

Lancastrian, a brown, foaled in 1876, by Toxopholite out of Lady Sefton by West Australian, won the Society's premium and medal last year, and stood in the Derbyshire district. He is a very useful horse.

Peppermint, a bay, foaled in 1879, by Camballo out of Mint-drop by Lozenge, is a capital type of hunting sire. Compact and active, with well-formed legs rightly-placed, he will be certain to find favour with breeders, and is well adapted for mating with coarse mares. Critics may think him a little wide in the chest and too full in the bosom, but it is hard to pick a fault in him.

Ruddigore, a chestnut five-year-old, by Thurio out of Blood Red by Lord Lyon, is a fine up-standing horse, as nearly as I could guess about 16½ hands in height. This horse has a splendid top-line, good quality, with great bone and capital feet. His weak point perhaps is in his shoulders.

¹ The three stallions selected for District D will stand during their season of service as follows:—*Peppermint* and *Ruddigore* at the stables of their respective owners, and *Lancastrian* at Sir Henry Simpson's Farm, South Lea, Datchet. The District Committees, to whom are to be referred all questions relating to the service of the stallions, have been constituted as under:—

Lancastrian: Mr. P. E. Crutchley, Sunninghill Park, Windsor.

Sir Henry Simpson, Gordon House, Windsor.

Mr. W. Tait, Prince Consort's Shaw Farm, Windsor.

Peppermint: Lord Apsley, Cirencester House, Cirencester.

Mr. E. H. F. Dawkins, The Manor House, Malmesbury.

Mr. T. B. Miller, Cricklade.

Ruddigore: Mr. E. W. Bell, Gillingham.

Mr. James Flower, Chilmark, Salisbury.

Mr. T. H. Miller, Osborne, Sherborne.—[F.D.]

Eclipse, a chestnut, foaled in 1883, by Ethus or Van Amburgh out of Tormentor by King Tom, standing about 16 hands, has good shoulders and well-placed legs, and is altogether a useful horse. He has been selected for District Class J, in which no awards were made by the Judges.

Pearl Diver, brown, foaled in 1882, by Master Kildare out of Three Pearls by Rosicrucian, is a nice-topped horse, well adapted for crossing with strong mares, and has been selected together with *Lion* for District Class C.

The entries in DISTRICT CLASS E numbered eleven, and *Pursebearer*, *Sir Joseph*, and *War Path* were selected for the premiums, *Jarnac* and *Knight Templar* being reserved. *Pursebearer*, by Scottish Chief out of Thrift by Stockwell, is a bay, standing just under 15 hands 3 inches, and was foaled in 1879. He is a short-legged, active horse, and will probably prove himself a useful sire. *Sir Joseph*, also a bay, by Pero Gomez out of Prosperity by Ethelbert, 14 years old, is a good-topped horse, showing much quality. *War Path*, foaled in 1882, by Uncas out of Installation by Knight of the Garter, is an up-standing horse, with good shoulders and well-placed fore-legs. He is a bay, with black points, and is a good-looking animal.

Jarnac, by Flying Dutchman out of Joilette by Surplice, is 22 years old. *Knight Templar*, a bay, foaled in 1874, by The Baron out of Miss Croft by Thormanby, is a charming well-balanced horse, and he has been selected to serve in Class H for Stirlingshire and district, for which no award was made from the original entries. Last year he failed to pass the veterinary examination at the Nottingham Spring Show; but at Newcastle in 1887 he qualified, and was the Royal Agricultural Society's premium stallion for the district of Durham.

Ten horses were entered in DISTRICT CLASS F, and the three premiums fell to *Loadstone*, *Portnellan*, and *Scherzo*. No horses were reserved. *Loadstone*, by Pellegrino out of Selly Oak by Paul Jones, is a dark brown, standing upwards of 16 hands 3 inches, and he has great bone and substance generally. He has been serving in Wales, and was not entered last year. *Scherzo*, by Galopin out of Bowstring by Tom Bowline, is a bay, 6 years old, and stood for the same district as a premium winner last year. He is a level, well-put-together horse, though exception might be taken to his shoulders, notwithstanding which he is likely to prove a useful sire.

There was a good entry of eleven stallions in DISTRICT CLASS G, out of which *Q.C.*, *Silver Crown*, and *Suleiman* were selected for premiums, with *Lion* and *Prescription* reserved. All these horses gained premiums last year. *Q.C.*, a brown, foaled

in 1883, by Wisdom out of Brenta by Parmesan, is a nicely-topped horse, with great liberty and action. *Silver Crown*, a chestnut, foaled in 1882, by Silvester out of The Queen by Fitz-Roland, is a very taking horse, and was extremely popular in the Nottinghamshire District, where he stood last year, when the nominations to him were quickly snapped up. He carries himself well and gaily, shows plenty of quality, and is altogether a good specimen of a weight-carrying thoroughbred horse, although there are others I should prefer to him as a hunter sire. *Suleiman* is a nice horse, by Knight of the Crescent out of Queen of Prussia by Orlando. The nineteen seasons which have passed over him have dipped his back; but he is a compact horse, and looks like a hunter-getter. He carries his years well, and as he did not commence service until 13 years old, he still appears fresh and vigorous. *Lion*, a bay, foaled in 1883, is by Rostrevor out of Queen of the Forest by The Ranger, and is a hunter-looking horse. He will serve in District C, having been chosen with *Pearl Diver* to fill the two vacancies in that class, and no doubt his list will soon be full.

None of the three horses entered in DISTRICT CLASS H were deemed worthy of a premium, and, as stated above, *Knight Templar*, the second reserve stallion in Class E, will serve in this district.

In DISTRICT CLASS I there were three entries, *Royalty* being selected for the premium, with *Porton* reserved. *Royalty*, a bay, nine years old, standing 16 hands, by Kaiser out of Circe by Dundee, is much improved since last year, when he was selected as being first reserve in Class D to serve in this district. He is a nice-looking horse, on short legs, with well-placed shoulders and plenty of bone; but his feet are open to criticism, and he might stand better on his legs. *Porton*, a chestnut, five years old, by Pellegrino out of Sally Black by Cathedral, like *Loadstone*, is an enormous horse, standing 16 hands 3 inches, or thereabouts. He has plenty of bone, and is well adapted for crossing with light mares.

In DISTRICT CLASS J three horses entered, but none of them were awarded a premium. *Eclipse*, the first reserve horse in Class D, has been chosen by the Royal Commissioners to serve in this district.

Only two horses were entered in DISTRICT CLASS K—viz. *Omega* and *Polardine*. To *Omega* the premium was awarded, and it will be remembered that this horse served in the district last year, having been selected as the first reserve in Class B. *Polardine* served in Class J last year. *Omega*, a bay, foaled in 1873, by Knight of the Garter out of Lambda by Umbriel,

stands about 15 hands 2 inches, long and low, with plenty of quality and substance, and as active as a cat. He is a charming horse, and though some may think him a little light in the barrel or long in the pasterns, he is, notwithstanding these supposed defects, just the sort of sire to get a hunter. *Polardine* is another little big one, but he unfortunately failed to qualify.

Altogether there was a good display of horses, and amongst the bigger ones the most fastidious breeder might pick a sire to suit from such as *Baldur*, *Bluegrass*, *Truefit*, *Connaught*, *Knight Templar*, *War Path*, *Even*, and *Lion*; whilst *City Arab*, *Omega*, *Peppermint*, *Suliman*, *Polardine*, and *Pursebearer* look just the sort to cross with the mares of the country.

APPENDIX.

LIST OF THOROUGHBRED STALLIONS TO WHICH PREMIUMS WERE AWARDED FOR SERVICE IN THE SEASON OF 1889.

District Class A. 21 Entries.

[Bedfordshire, Buckinghamshire, Cambridgeshire, Essex, Hertfordshire, Huntingdonshire, Middlesex, Norfolk, Oxfordshire, and Suffolk.]

- No.
 1. Premium of 200*l.* to Col. Frederick Barlow, for *Baldur*.
 12. " " to Walter Gilbey, for *Pedometer*.
 21. " " to William Burdett-Coutts, M.P., for *Truefit*.
 3. Reserve No. 1 to the Duke of Hamilton and Brandon, for *City Arab*.
 16. Reserve No. 2 to William Henry Moor, for *Red Willow*.
 2. Reserve No. 3 to George Ireland, for *Ben Alder*.

District Class B. 6 Entries.

[Cumberland, Durham, Northumberland, and Westmorland.]

22. Premium of 200*l.* to William Steel, for *Bluegrass*.
 25. " " to Robert Clark, for *Even*.
 27. " " to E. Hodge Banks, for *Moss Hawk*.
 26. Reserve Number to David Cooper, for *Linnaeus*.

District Class C. 7 Entries.

[Derbyshire, Leicestershire, Lincolnshire, Northamptonshire, Nottinghamshire, and Rutlandshire.]

30. Premium of 200*l.* to James Edward Platt, for *Connaught*.
 *73. (Reserve No. 1, in Class G) Premium of 200*l.* to the Duke of Hamilton and Brandon, for *Lion*.
 *40. (Reserve No. 2 in Class D) Premium of 200*l.* to Walter Gilbey, for *Pearl-Diver*.

District Class D. 13 Entries.

Berkshire, Cornwall, Devonshire, Dorsetshire, Hampshire, Kent, Somersetshire, Surrey, Sussex, and Wiltshire.]

(The Premiums and Gold Medals in this District were offered by the Royal Agricultural Society of England.)

- No.
 37. 200*l.* and Special Gold Medal to Alexander Taylor, for *Lancastrian*.
 41. " " " to James Joicey, for *Peppermint*.
 43. " " " to The Compton Stud Company, for
Ruddigore.
 *35. Reserve No. 1 to G. P. Finch, for *Eclipse* (see District J).
 *40. Reserve No. 2 to Walter Gilbey, for *Pearl-Diver* (see District C).

District Class E. 11 Entries.

[Yorkshire.]

55. Premium of 200*l.* to William Jackson, jun., for *Pursebearer*.
 56. " " to Joseph Shepherd, for *Sir Joseph*.
 58. " " to the Earl of Zetland, for *War Path*.
 51. Reserve No 1 to Sir W. Vavasour, Bart., for *Jarnac*.
 53. Reserve No. 2 to J. H. Stephenson, for *Knight Templar* (see District H).

District Class F. 10 Entries.

[Gloucestershire, Herefordshire, Monmouthshire, Shropshire, Staffordshire, Warwickshire, Worcestershire, and South Wales.]

61. Premium of 200*l.* to T. V. Howell Thomas, for *Loadstone*.
 65. " " to Robert James Mann, for *Portnellan*.
 66. " " to John Rees, for *Scherzo*.

District Class G. 11 Entries.

[Cheshire, Lancashire, and North Wales.]

75. Premium of 200*l.* to William E. Litt, for *Q.C.*
 76. " " to James E. Platt, for *Silver Crown*.
 79. " " to Albert O. Haslewood, for *Suleiman*.
 73. Reserve No. 1 to the Duke of Hamilton and Brandon, for *Lion* (see District Class C).
 74. Reserve No. 2 to Sir Humphrey F. de Trafford, Bart., for *Prescription*.
 70. Reserve No. 3 to William Steel, for *Cyprus*.

District Class H. 3 Entries.

[Stirlingshire and District.]

- * 53. (Reserve No. 2 in Class E) Premium of 200*l.* to J. H. Stephenson, for *Knight Templar*.

District Class I. 3 Entries.

[Fifeshire, Kinross-shire, and District.]

85. Premium of 200*l.* to William Warren, for *Royalty*.
 83. Reserve Number to Thomas Cannon, for *Porton*.

District Class J. 3 Entries.

[Ayrshire, Dumfriesshire, and District.]

No.

- * 35. (Reserve No. 1 in Class D) Premium of 200*l.* to G. P. Finch, for *Eclipse*.

District Class K. 2 Entries.

[Roxburghshire, Berwickshire, and District.]

89. Premium of 200*l.* to Robert F. Trenholm, for *Omega*.

Note.—Only one horse was chosen for a Premium from the entries in Class C, and no selection was made from the entries in Classes II and J. The vacancies in these districts were therefore filled up from the Reserve horses in the other classes.

VI.—*American Cattle Markets and the Dressed Beef Trade, with some Statistics of the Live-Stock Trade in the United States.*
By JOHN CLAY, Jun., 115 Dearborn Street, Chicago.

THE North American Continent consists politically, socially, and to a great extent commercially, of three countries. British North America, the greatest in extent, lies on the north, Mexico lies on the south, and betwixt the two are situated the United States. The nature of the climate, and the vast tracts of barren land contained in the British Dominion, will never allow it, at least for many years, to become an important factor in the beef trade of the world. It is true that it has, and probably will, export more or less cattle from favoured districts, more especially Ontario and portions of its North-West Territories; but its sub-arctic winter will always be an obstacle in the line of great improvement in strictly beef production. In the dairy products of the world it is certain that the old Canadian provinces will always take a leading part. The quality of the soil and the habits of the people lead to this end, and the rapid development of the cheese industry in various parts of the country proves pretty conclusively that the business is a success. On the other hand, in the Southern Republic there is not much to fear in the way of competition so far as cattle-growing is concerned. If to Spanish indolence and a deplorable government is added the fact that the climate is semi-tropical, it is apparent that not much advance can be made in the direction we are treating of. Great herds of cattle roam over the dry plateaus of this vast Mexican Republic; but they are poor in quality, and totally unsuited for anything but "canning." Occasionally they are driven across

the border, but the number imported is small and scarcely worth considering.

It is in the United States that the live-stock industry has grown to leviathan proportions, and, though this article is headed "American Cattle Markets," it is proposed to treat entirely of the United States. While, of course, the cattle business must be incidentally mentioned in a general way, still the object of the paper is to lead up to the great cattle markets, more especially in the West, through whose gates the finished product of the feeder reaches the homes of the consumer.

Towards the end of the eighteenth century the American people began to feel the pulsations of a new life. On July 4, 1776, they had become an independent Republic. Their national life was confined mainly to the sea-board States, although the trappers and the pioneers had sailed over the mighty lakes of the interior and had worked their way up the great and seemingly never-ending rivers, the Mississippi and Missouri. For three-quarters of a century the history of the cattle business is very short. It was confined to small local markets, and though some more progressive farmers in Ohio and Kentucky had imported the blood of Booth and Bates, yet the years rolled on and every neighbourhood supplied its own demands. The wide fields of the West were not open, and the South was dominant in politics. The energies of the country, as far as agriculture was concerned, were confined to working in the tobacco-plantations of Virginia, around the cotton-fields of Alabama, and among the forests of sugar-cane in Louisiana. Settlements had been gradually creeping westward; the Alleghanies had been crossed, Kentucky, Ohio, and Indiana had been settled, and the country, certain of its rich heritage, was slowly and surely marching onwards. In 1830, or thereabouts, Chicago—the future Mecca of the cattle-man—had come into existence, and it struggled along almost unnoticed for several years. The era of railroads followed, and Sutter, peering down into the "tail race," as we would call it, which carried the waters away from his flouring mill, saw the gold sparkle under the brilliant sun of California. That was in 1848. The new discovery led to great results. There came a wild rush from all parts of the world to the bonanzas which lay hid among the gulches of the Sierra Nevadas. The spirit of adventure was abroad, and as the long trains of "prairie schooners" made their way slowly across the plains, the American people began to realise the value of their "Western Desert." Ten years later Colorado became the arena of another mining excitement.

Out of all this turmoil there was evolved the fact, and a fact which American enterprise was not slow to grasp, that the

West was a mighty country from whose latent soil there could be extracted thousands of dollars where one would come from the bowels of the earth. Like the old farmer digging round all his apple trees in hopes of finding a pot of gold, the American people in their wild rush for the precious metal had discovered, as it were, a new continent. The silent wealth of ages was to be dormant no longer. The rich black soil of the prairie was to send forth its riches in the shape of wheat and Indian corn, in beef and pork, and in every other product known to agriculture. Gold was the goal; but in reaching it a mine of practically inexhaustible wealth was opened, and not only the Americans themselves, but countless immigrants, are ploughing up its treasures to-day. Following the discovery of the Colorado gold and silver mines came the War. The work of Western immigration was practically stopped, and for four long years little progress was made. When Richmond fell, however, and the sword was laid aside for the ploughshare, there commenced that settlement of the West which has changed to a great extent the agriculture of the world, and in whose centre have been located markets for grain and stock of unparalleled magnitude. The history of the American cattle business, aside from a mere local industry, commences with the close of the War. Shortly after that time the markets which control the supply came into existence, and have yearly been growing in importance.

The process of centralisation has been gradually increasing, and, so far as we can see, it is bound to keep moving in the same direction. The tendency of the age is to concentrate and create great markets at certain points, and in no instance has this fact been more clearly exemplified than in connection with the American beef trade. Before, however, taking up in detail our great market centres, it will be well to glean from the Government returns (which are as nearly correct as it is possible to get figures of this kind) the numbers of cattle, their average price and values, in the different States and Territories comprised in the Union. Those figures and values refer to the year 1887, the latest official information obtainable.

From a perusal of the Table on page 127 it will be noticed that the Eastern States are distinctly dairy States; that in the South the numbers of the dairy and beef breeds are pretty equally divided; while the West has a strong preponderance of strictly beef cattle. The further West, the stronger is the tendency to run to the latter class. Where a country is closely settled there are bound to be more milch cows, and thus the above returns show that the march of empire, so far as beef is concerned, is toward

TABLE SHOWING THE NUMBERS OF CATTLE, THEIR AVERAGE PRICE PER HEAD, AND TOTAL VALUES, IN EACH STATE AND TERRITORY IN THE UNION.

States and Territories	Milch cows			Oxen and other cattle		
	Number	Average price	Value	Number	Average price	Value
Maine	167,507	\$ 29-00	\$ 4,857,703	185,160	\$ 27-51	\$ 5,093,108
New Hampshire	99,021	30-50	3,020,141	141,670	29-94	4,241,119
Vermont	225,552	28-70	6,473,342	180,362	28-05	5,059,693
Massachusetts	180,319	34-17	6,161,500	105,023	28-47	2,990,105
Rhode Island	22,883	35-75	818,067	13,154	32-27	424,463
Connecticut	127,153	33-71	4,286,328	109,926	31-24	3,434,104
New York	1,540,053	30-50	46,971,617	851,128	31-92	27,164,603
New Jersey	178,114	35-92	6,397,855	68,541	32-35	2,217,467
Pennsylvania	929,371	28-60	26,580,011	867,059	26-09	22,620,106
Delaware	28,683	30-00	860,490	27,137	28-00	759,835
Maryland	135,021	28-25	3,814,343	138,182	24-18	3,340,798
Virginia	257,793	21-50	5,542,550	423,761	17-37	7,360,725
North Carolina	243,758	16-00	3,900,128	419,383	10-99	4,607,133
South Carolina	146,195	19-00	2,777,705	212,521	12-48	2,651,835
Georgia	337,603	17-00	5,739,251	598,656	11-01	6,588,930
Florida	52,822	16-32	862,055	576,912	8-56	4,941,078
Alabama	296,787	15-40	4,570,520	445,139	9-41	4,187,825
Mississippi	285,904	15-55	4,445,807	428,909	9-48	4,064,000
Louisiana	162,649	16-30	2,651,179	270,816	11-33	3,069,187
Texas	772,716	14-20	10,972,567	6,336,504	9-95	63,077,993
Arkansas	304,404	14-63	4,453,431	469,057	9-81	4,603,415
Tennessee	339,572	19-75	6,706,547	461,239	12-61	5,815,073
West Virginia	171,273	24-07	4,122,541	280,892	18-50	5,196,913
Kentucky	313,953	24-30	7,629,058	529,018	21-24	11,237,676
Ohio	783,481	29-20	22,877,645	967,540	25-60	24,766,690
Michigan	437,303	29-00	12,681,787	511,406	25-16	12,865,948
Indiana	556,961	27-75	15,455,668	894,344	22-44	20,066,941
Illinois	937,476	26-50	24,843,114	1,485,754	22-23	33,029,792
Wisconsin	548,222	23-83	13,064,130	640,752	20-97	13,438,163
Minnesota	433,966	23-75	10,306,693	489,886	20-36	9,974,076
Iowa	1,255,432	23-30	29,251,566	2,095,253	20-35	42,633,795
Missouri	737,259	20-25	14,929,495	1,429,453	18-24	26,077,367
Kansas	640,081	22-41	14,344,215	1,583,915	20-37	32,271,946
Nebraska	357,202	25-50	9,108,651	1,079,646	21-08	22,763,690
California	250,773	33-00	8,275,509	692,267	20-50	14,194,447
Oregon	78,997	29-60	2,338,311	598,218	20-35	12,172,122
Nevada	18,037	35-00	631,295	323,400	18-00	5,819,648
Colorado	63,023	37-21	2,345,086	1,049,353	19-93	20,918,327
Arizona	16,298	37-20	606,286	420,000	18-00	7,560,000
Dakota	223,418	21-67	4,841,468	767,809	21-73	16,687,171
Idaho	26,458	26-67	705,635	424,316	18-75	7,955,925
Montana	31,132	28-40	884,149	934,500	19-21	17,948,007
New Mexico	19,394	23-75	460,608	1,257,597	15-04	18,911,121
Utah	49,878	25-25	1,259,420	435,000	16-76	7,292,733
Washington	65,523	33-30	2,181,916	300,676	23-48	7,060,177
Wyoming	6,994	35-00	244,790	1,230,192	19-11	23,504,663
Indian Territory	—	—	—	626,937	14-50	9,090,587
Total	14,856,414	24-65	366,252,173	34,378,363	17-79	611,750,520

the West; but the cause is not so much in the above reason as in the fact that the agriculture of the States is changing. It is getting to be more and more settled; the rough-and-ready style is becoming a thing of the past, and the methods employed are steadier and more applicable to the location and the climate of the various districts. The farmers of the older States, with their lands partially worn out, but with better improvements and finer buildings, have taken up pursuits more suited to their condition. "Muck," as the late George Hope of Fenton Barns used to call it, is being saved, and the soil is receiving back part of the nutriment it has so generously given up. There are, of course, beef cattle raised in every part of the country, but the lines are being more sharply defined every year.

Within the last ten years this fact has been especially noticeable, and, as water finds its level, so the different industries connected with cattle are becoming located in certain parts of the Union. Thus, the Eastern States are strongly inclined to dairying, the Central States to feeding, and the Western States and Territories to raising and feeding combined. In certain parts of the Central States, such as Ohio, Michigan, Illinois, Wisconsin, Minnesota, and Iowa, large dairy interests have developed, and a considerable export trade to other States is carried on; but, as a general rule, the corn (that is, Indian corn) States are the feeding States, and this industry is developing wonderfully as the cheap lands of Iowa, Nebraska, Kansas, and kindred States are brought under the influence of the plough. Further westward still lie the range districts. The cattle from the Western plains have, as a rule, been used for dressed beef or put into cans; but the day is not far distant when the great majority will find their way into the feed lots of Kansas, Nebraska, Iowa, and Missouri before coming to market. Texas, with her millions of cattle, is already endeavouring to mature, as far as possible, her aged steers on the black lands of her eastern border; while for years past thousands of her young cattle have been driven to the Indian Territory, Colorado, Wyoming, and Montana, to be fattened there on the stronger and more succulent grasses of a northern clime. In this latter business alone there is an immense market; but it is of a scattering, desultory nature, the transactions taking place in all manner of places—in the drawing-room, in the rotunda of some prominent hotel, or oftentimes under the burning sun of the Texas plains. The magnitude of the deals can be judged from the fact that a bargain comprising the delivery of 17,000 steers to one firm was consummated at Kansas City, Missouri, some days ago, and the writer has repeatedly purchased 4,000 to 5,000 cattle at one time.

As cotton used to be king, and still is in the South, so corn is King in the West ; but the foundation of the American cattle business is distinctively grass. Ninety per cent. of the feed consumed by cattle in the States is composed of grass. The day of roots and grain, making in a great measure feed for our bovines, has not yet come, and it is likely that blue grass, with a relatively small addition of corn, will be the mainstay of our cattle business for years to come. In the range districts no artificial food is used. The cattle roam over vast pastures or the open prairie, gathering up what they can in summer and winter. With a plentiful supply of grass properly cured, the ranchmen can laugh at the elements. But the overstocking of the ranges during the last few years has worked terrible havoc in this industry, and it is only now beginning to recover.

Before passing to the question of our cattle markets, it may be well to remark that the cattle of the United States as well as of Canada are making great advances in quality. The days of heavy cattle are evidently numbered, and the steers which pay the feeder are those which ripen early and evenly. The 1,250-lb. bullock is more popular and profitable than the 1,600-lb. old-fashioned steer, although he may be as fat as a hog. Two causes have led up to this state of affairs. First, the increasing demand for smaller cuts—for the average American wants hot meat, and he wants it often ; and secondly, the energy and enterprise shown by the fine stock breeders of the continent in introducing pure-bred cattle. The average farmer who wishes to buy a thoroughbred bull, a pedigree pig, or a first-class ram, can generally supply his wants at his door. It is doubtful if as a business the breeding of pure-bred stock has been a paying one to the individual breeder, but certain it is the live-stock feeders of America have put millions of dollars into their pockets through the efforts more especially of the breeders of the "red, white, and roans," and the omnipresent Berkshire pig.

As stated above, up to the end of the Civil War, which changed to a great degree the fabric of American national life, and among other alterations helped in a certain measure to open up the fertile prairies of the West, the cattle markets had to a great extent been local. The movement of produce from the West to the East was in an embryo state. But when the War ceased, then the country, rising like a phoenix from its ashes, began to build up, with gigantic energy, markets of unrivalled magnitude.

Some sixty years ago Chicago was a small hamlet set down, as it were, in the middle of a marsh on the banks of a stream, which sends its waters in two directions, sometimes flowing towards Lake Michigan, and at other times, with some artificial

help, its waters finding their way down the Mississippi into the Gulf of Mexico. Geographically, however, the situation was good, and the town rapidly grew, and was doing a flourishing trade before many years had elapsed. It commanded the Lake trade; its vessels spread their "white wings" over the great unsalted seas of the American Continent. Then came the steam-engine and the propeller of to-day. Just about the time Chicago got its name, George Stephenson was perfecting his railroad schemes; and Chicago, far away in the West, was soon to become almost the mightiest monument ever erected to his supreme genius. As all roads led to ancient Rome, so to-day do all the great railroad systems of the country (except in the South) lead directly or indirectly to Chicago; and with this advantage, and the control to a certain degree of the Lake trade, it is little wonder that this point became the centre of the cattle business of the continent. There are, of course, other markets, but they are either adjuncts to a great extent, or they draw their supplies from this great central mart. In the East we have New York, Boston, Albany, Buffalo, Pittsburg, and the various large centres of population. Those points, however, draw their extra supply from Chicago, not enough of local stuff coming to hand to meet the demand. North, West, and South, we have St. Paul—as yet a very small market, but destined to grow—Omaha, Kansas City, and St. Louis. Of these, Kansas City is far the largest, having cut off a great deal of trade that in past days flowed to the last-named town—in fact, so much is this the case that St. Louis has ceased to be an important factor in our great cattle markets. The business of the West and South, so far as cattle are concerned, is centering in Chicago, Kansas City, and Omaha. The two latter are feeders of the former, although Kansas City, from its location, commanding to a great extent the trade of Kansas, the Indian Territory, New Mexico, and Texas, must some day be a formidable rival of its present leader.

The statistics on page 130, drawn from official records, will be of great interest.

From these facts many lessons can be gleaned. We see that in 1865, just after the close of the War, the Chicago market became one of public record. During the above year a Charter was issued by the State of Illinois to the Union Stock Yard and Transit Company, allowing them to conduct their business. It would be waste of space to go into the nature of the Charter and minutiae of the business during the past twenty-three years, save to say that, as will be gathered from the statistics, it has had a steady flow of success.

CHICAGO MARKET.

I.—TOTAL RECEIPTS AND SHIPMENTS FOR THE YEAR 1888.

Receipts							Shipments						
Month	Cattle	Calves	Hogs	Sheep	Horses	Total No. Cars	Cattle	Calves	Hogs	Sheep	Horses	Total No. Cars	
January	223,851	2,771	584,734	111,431	3,460	20,223	86,995	1,320	197,604	34,834	3,361	7,096	
February	166,336	3,082	426,036	92,715	5,223	15,325	67,822	459	153,790	21,123	5,212	5,701	
March	182,408	4,010	419,307	106,333	5,664	16,068	72,471	815	181,213	22,900	5,561	6,322	
April	182,015	6,820	380,792	110,453	5,159	15,693	73,238	638	164,619	40,128	5,089	6,405	
May	204,919	9,965	482,770	136,750	6,591	18,174	81,737	220	167,407	52,855	6,290	7,053	
June	201,647	11,711	451,182	112,972	5,531	16,929	69,916	1,574	152,926	53,714	5,250	5,974	
July	205,814	11,730	331,379	96,740	4,460	15,406	72,216	3,034	170,261	35,610	4,159	6,091	
August	232,040	12,559	267,715	142,646	4,882	16,010	81,412	3,622	129,501	61,923	4,467	6,308	
September	259,736	13,796	263,438	136,735	4,147	17,165	95,163	4,601	128,036	60,898	3,994	7,101	
October	281,156	9,781	381,842	187,450	4,093	20,278	99,297	2,597	123,456	95,500	3,652	7,446	
November	259,760	7,425	482,442	141,956	2,796	20,785	85,180	2,466	90,917	59,052	2,703	6,295	
December	211,861	5,436	447,075	135,833	3,287	18,751	82,938	2,317	92,099	62,704	3,128	6,382	
Total for 1888	2,611,543	96,086	4,921,712	1,515,014	55,333	210,807	968,385	23,663	1,751,829	601,241	52,866	78,174	
Total for 1887	2,382,008	65,859	5,470,852	1,360,862	46,404	212,288	791,483	15,956	1,612,001	445,094	46,155	67,954	
Cars for 1888	125,139	906	66,049	12,232	3,481	210,807	53,824	371	17,326	3,555	3,098	78,174	

II.—TOTAL RECEIPTS AND SHIPMENTS OF STOCK FOR TWENTY-THREE YEARS.

Year	Receipts					Shipments				
	Cattle	Calves	Hogs	Sheep	Horses	Cattle	Calves	Hogs	Sheep	Horses
1865, 5 days	613	—	17,764	1,433	—	—	—	—	—	—
1866	393,007	—	961,746	207,987	1,553	263,693	—	482,875	75,447	162
1867	329,188	—	1,696,738	180,888	847	320,580	—	758,789	50,275	387
1868	324,524	—	1,706,782	270,891	1,902	215,987	—	1,020,329	81,634	2,185
1869	403,102	—	1,661,869	340,072	1,524	294,717	—	1,086,305	108,890	1,538
1870	532,964	—	1,693,158	349,853	3,537	391,709	—	924,453	116,711	3,488
1871	543,050	—	2,380,083	315,053	6,963	401,927	—	1,162,286	136,084	5,482
1872	684,075	—	3,252,623	310,211	12,145	510,025	—	1,835,594	145,016	10,625
1873	761,428	—	4,437,750	291,734	20,289	574,181	—	2,197,557	115,235	18,540
1874	843,966	—	4,258,379	333,655	17,588	622,929	—	2,330,361	180,555	16,608
1875	920,843	—	3,912,110	418,948	11,346	696,534	—	1,582,643	243,604	11,129
1876	1,096,745	—	4,190,006	364,095	8,159	797,724	—	1,131,635	195,925	6,839
1877	1,033,151	—	4,025,970	310,240	7,874	703,402	—	1,262,606	156,727	8,176
1878	1,083,068	—	6,339,654	310,420	9,415	699,108	—	1,692,361	159,266	9,289
1879	1,215,732	—	6,448,330	325,119	10,473	726,903	—	1,394,990	156,510	8,713
1880	1,382,477	—	7,059,355	335,810	10,398	886,614	—	1,289,679	253,938	11,108
1881	1,498,550	48,948	6,474,844	493,624	12,909	938,712	33,465	1,747,722	314,200	12,788
1882	1,582,530	24,965	5,817,504	628,887	13,856	921,009	10,229	1,319,392	374,463	14,698
1883	1,878,944	30,223	5,640,625	749,917	15,255	966,758	12,671	1,392,615	290,352	18,247
1884	1,817,697	52,353	5,351,967	801,630	18,602	791,884	31,089	1,797,446	260,277	18,582
1885	1,905,518	58,500	6,718,761	1,008,790	27,599	701,675	18,557	2,090,784	266,812	26,388
1886	1,963,908	51,290	5,470,852	1,360,862	46,404	791,483	15,956	1,812,001	445,094	46,155
1887	2,382,008	65,859	4,921,712	1,515,014	55,333	968,385	23,663	1,751,829	601,241	52,866
1888	2,611,543	96,086	4,921,712	1,515,014	55,333	968,385	23,663	1,751,829	601,241	52,866
Total.	27,188,623	428,224	101,376,117	12,228,731	332,327	14,816,032	179,340	33,019,773	4,882,510	310,591

III.—LARGEST RECEIPTS OF STOCK.

Largest Receipts in a Day.					Largest Receipts in one Month.				
Cattle, Nov. 19, 1888				20,063	Cattle, Oct. 1888				281,156
Calves, Sept. 1, 1885				1,773	Calves, Sept. 1885				15,449
Hogs, Dec. 5, 1884				66,587	Hogs, Nov. 1880				1,111,997
Sheep, Oct. 4, 1888				12,120	Sheep, Oct. 1888				187,450
Horses, May 14, 1888				789	Horses, May 1888				6,891
Cars, Dec. 10, 1884				1,522	Cars, Dec. 1884				25,387
Largest Receipts in one Week.					Largest Receipts in one Year.				
Cattle, week ending Oct. 22, 1888				71,310	Cattle, 1888				2,611,543
Calves, week ending Sept. 12, 1885				4,369	Calves, 1888				96,086
Hogs, week ending Nov. 20, 1884				300,488	Hogs, 1880				7,059,355
Sheep, week ending Oct. 6, 1888				48,681	Sheep, 1888				1,610,014
Horses, week ending May 19, 1888				1,926	Horses, 1888				55,333
Cars, week ending Dec. 6, 1884				6,964	Cars, 1885				214,146

IV.—VALUATION OF STOCK FOR TWENTY-THREE YEARS.

1866	\$ 42,765,328	1872	\$ 87,500,000	1878	\$ 106,101,879	1884	\$ 187,387,680
1867	42,375,241	1873	91,321,162	1879	114,795,834	1885	173,598,002
1868	52,606,288	1874	115,049,140	1880	143,067,626	1886	166,741,754
1869	60,171,217	1875	117,533,942	1881	183,007,710	1887	176,644,597
1870	62,090,631	1876	111,185,650	1882	196,670,221	1888	182,202,789
1871	60,331,082	1877	99,024,100	1883	201,252,772		Total \$2,773,314,645

It will be noted that in twenty-three years the increase in cattle has been six-fold and over ; while the shipments have decreased wonderfully in proportion. To-day, instead of shipping 70 per cent. of the cattle received, we slaughter over that number, and less than 30 per cent. are forwarded alive. Thus, in fact, about 70 cattle out of every 100 are slaughtered in Chicago. The greatest increase in any one year was in 1887, when we received 418,108 cattle more than in 1886. Last year, 1888, we note another increase of 229,535 head, making a total increase during the past two years of 647,643 head. This is a remarkable augmentation, and is due to various causes which will be discussed later on.

In passing, it will be noted that the shipments made proportionately a great advance in 1888, which is accounted for by the fact that all classes of cattle last season have, on the average, commanded higher prices than in 1887, which was the zero mark in values so far as the Chicago cattle market as at present organised has ever seen. The demand, more especially during the summer months, was active, and competition was excellent for all grades of cattle.

The receipts by the day, month, and year must astound readers who are not acquainted with the trade carried on in the above Yards. The market goes on day after day: no halt except on Saturday, when but few cattle are received, probably one-fourth of the usual receipts. Cattle are received on all days of the week and year, but no shipping takes place on Sunday or holidays, while trading and all classes of work, except what is absolutely necessary, are stopped on the first day of the week.

The Stock Yards of Kansas City were organised in 1871, and while their growth has not been so steady as that of Chicago, the increase of receipts during the last year has been phenomenal. The increase, however, is not entirely what might be termed natural. It is owing to the development of the railway systems, which centre at this point : and what has been Kansas City's gain has been St. Louis' loss. Railroads pushing out into Texas from the former point have diverted cattle from the older lines that had connections with the latter city, and the further building and extensions of such lines promise to make the Kansas City Stock Yards as a receiving point almost the equal of Chicago. It will be noted, however, that it is, for the present at least, very much of a stopping point, as the shipments are exceedingly heavy ; many of the cattle coming from the South and West not paying yardage, but coming straight on, after feeding, to the older market. However, of the 1,056,086 head received at this point in 1888, 372,925 were

used by the home packers and slaughterers, and are included among the shipments. For this reason the receipts and shipments, of which details are given on page 134, are nearly equal.

With Texas opening up year by year, we may expect vast developments in this market during the next few years, and while as a slaughtering point it may not equal Chicago, still its growth must be rapid from this time forth. The quality of the cattle will, however, fall far below that of those received at Chicago and Omaha.

While a local market had existed for many years at Omaha, it was not till 1884 that a Stock Yards Company was organised and a daily market fairly established. Since then it has made a steady growth, details of which are given on page 135. It commands a wide territory just opening up, and is destined to be an important point in the cattle trade of the West, although for past years it has served very much as a feeder to Chicago.

Leaving statistics behind, let us now take up the principal points connected with our cattle markets. It would be impossible, of course, to treat in detail of the various markets of the United States; Chicago being the centre of the live-stock trade, it will be better to deal exclusively with it. As mentioned previously, the Chicago Stock Yards were organised and opened in 1865. The Stock Yards Company at the present time own 400 acres of land—320 acres in one block, and 80 acres in outlying lots. The larger tract is devoted to the Stock Yards; some 200 acres being devoted to yards, &c., while the balance is occupied by railroad tracks and car sidings. Twenty great trunk railroads, fed by hundreds of branches which stretch like a mighty octopus over the land, deliver and carry away the raw and manufactured articles which arrive at and depart from this spot. During early morning the Western roads are busy unloading their freight of cattle, hogs, and sheep; while in the afternoon the Eastern roads are equally busy taking delivery and loading up the stock that is going to Boston, New York, and countless other points. At the packing-houses the work goes on all day—one train following another carrying away the finished product of the butcher and packer.

The Stock Yards Company own all the railroad tracks (over 150 miles in all), and within the last year have done all the switching or shunting connected with the business of the Yards. Every railroad company has a direct communication with the Yards, either through its own tracks or by the Belt line; at any rate, they can all get there without trouble, and no delays take place. The Yards can accommodate at their fullest capacity over 20,000 cattle, 120,000 hogs, and 15,000 sheep; and while

134 American Cattle Markets and the Dressed Beef Trade.

KANSAS CITY MARKET.

I.—TOTAL RECEIPTS AND SHIPMENTS FOR THE YEAR 1888.

Month	Receipts					Shipments				
	Cattle	Hogs	Sheep	Horses and Mules	Cars	Cattle	Hogs	Sheep	Horses and Mules	Cars
January .	47,264	195,009	17,610	1,267	4,867	46,422	192,907	17,887	805	1,100
February .	48,903	175,685	19,685	2,257	4,707	49,018	170,085	19,254	2,161	1,507
March .	47,877	172,646	17,841	2,918	4,590	48,263	176,023	17,929	2,854	1,600
April .	44,548	189,341	24,629	1,141	4,689	44,587	190,190	25,210	1,856	1,666
May .	45,113	235,243	39,708	2,365	5,406	44,685	233,015	37,377	2,502	1,583
June .	72,205	167,373	30,524	2,163	5,520	72,268	170,887	32,167	1,953	2,331
July .	96,875	102,873	26,564	3,362	5,756	93,526	103,635	24,621	3,353	3,137
August .	130,532	85,317	33,563	2,798	6,942	131,285	86,296	34,356	2,496	4,447
September .	133,684	93,130	36,099	2,341	7,040	135,408	92,930	35,254	2,691	4,381
October .	163,887	179,629	44,131	2,450	9,529	158,717	180,621	43,706	2,225	4,884
November .	142,583	227,426	32,816	2,189	9,230	145,343	225,319	34,774	2,174	4,210
December .	82,615	185,312	27,880	2,109	6,390	86,025	187,282	29,261	2,769	2,367
Total .	1,056,086	2,008,984	351,050	27,650	74,666	1,055,547	2,009,250	351,796	27,739	33,213

II.—TOTAL RECEIPTS AND SHIPMENTS OF STOCK FOR EIGHTEEN YEARS.

Year	Receipts					Shipments				
	Cattle	Hogs	Sheep	Horses and Mules	Cars	Cattle	Hogs	Sheep	Horses and Mules	Cars
1871. . .	120,827	41,036	4,527	809	6,623	120,794	40,102	4,527	809	5,125
1872. . .	236,802	104,639	6,071	2,648	13,110	236,799	104,399	6,071	2,648	10,683
1873. . .	227,689	221,815	5,975	4,202	14,603	227,666	220,574	5,951	4,202	10,044
1874. . .	207,080	212,532	8,855	3,679	13,370	207,069	212,714	8,877	3,685	10,879
1875. . .	174,754	63,350	25,327	2,646	9,093	174,211	63,096	25,310	2,635	7,036
1876. . .	183,378	153,777	55,045	5,339	11,692	183,256	153,180	54,829	5,321	7,131
1877. . .	215,768	192,645	42,190	4,279	13,058	215,771	193,204	42,333	4,296	7,366
1878. . .	175,344	427,777	36,700	10,796	16,583	175,549	426,355	37,012	10,794	9,483
1879. . .	211,415	588,908	61,684	15,829	20,702	211,361	589,794	61,157	15,826	12,741
1880. . .	244,703	676,477	60,611	14,086	22,701	244,281	676,848	61,004	14,090	12,874
1881. . .	285,863	1,014,304	79,924	12,592	29,089	285,134	1,015,447	79,848	12,604	14,382
1882. . .	439,671	963,036	80,724	11,716	31,668	439,521	961,900	80,708	11,607	19,698
1883. . .	460,780	1,379,401	119,665	19,860	45,470	460,598	1,379,005	119,180	19,869	24,662
1884. . .	533,526	1,723,586	237,964	27,163	55,227	533,992	1,724,287	237,214	27,092	32,056
1885. . .	506,627	2,358,718	221,801	24,506	63,213	506,577	2,359,027	223,088	24,656	33,452
1886. . .	490,971	2,264,484	172,659	33,188	58,924	490,906	2,264,323	172,397	33,098	27,050
1887. . .	669,224	2,423,262	209,956	29,690	67,752	669,062	2,423,546	209,491	29,618	31,489
1888. . .	1,056,086	2,008,984	351,050	27,650	74,666	1,055,547	2,009,250	351,796	27,739	33,213
Total .	6,440,514	16,818,731	1,770,728	250,678	571,447	6,439,094	16,817,057	1,770,793	250,589	309,364

III.—LARGEST RECEIPTS OF STOCK.

Largest Receipts in one Day.

Cattle, Oct. 23, 1888	11,233
Hogs, Nov. 15, 1887	21,765
Sheep, May 26, 1888	6,033
Horses and Mules, May 20, 1884	730
Cars, Nov. 13, 1888	616

Largest Receipts in one Week.

Cattle, Oct. 31, 1888	61,721
Hogs, Nov. 30, 1887	103,544
Sheep, Oct. 31, 1888	15,028
Horses and Mules, May 31, 1886	1,383
Cars, Oct. 31, 1888	3,483

Largest Receipts in one Month.

Cattle, Oct. 1888	163,887
Hogs, Nov. 1887	306,456
Sheep, Oct. 1888	44,131
Horses and Mules, March 1886	4,002
Cars, Oct. 1888	9,529

Largest Receipts for one Year.

Cattle, 1888	1,056,086
Hogs, 1887	2,423,262
Sheep, 1888	351,050
Horses and Mules, 1886	33,188
Cars, 1888	74,666

OMAHA MARKET

I.—TOTAL RECEIPTS AND SHIPMENTS FOR THE YEAR 1887-88.

Months	Receipts					Shipments				
	Cattle	Hogs	Sheep	Horses and Mules	Total No. Cars	Cattle	Hogs	Sheep	Horses and Mules	Total No. Cars
December	12,217	124,830	6,607	204	2,552	6,468	17,324	5,088	21	611
January	12,865	71,220	6,539	6	1,718	7,772	4,230	4,632	3	475
February	13,392	79,770	9,183	181	1,877	8,236	1,060	8,132	149	500
March	23,043	77,371	11,574	88	2,357	17,215	2,577	9,367	23	994
April	35,782	105,912	13,466	187	3,393	24,459	12,528	11,104	95	1,509
May	35,175	157,783	9,152	432	4,086	21,709	52,088	6,496	364	1,709
June	22,969	179,903	5,377	777	3,798	10,902	77,532	1,500	614	1,369
July	21,413	122,871	5,194	828	2,918	9,038	69,735	2,568	601	1,144
August	30,318	93,674	16,131	531	2,904	16,010	36,396	10,427	366	1,144
September	52,060	83,326	27,035	670	3,892	38,831	23,807	22,736	579	2,195
October	44,404	93,495	31,829	845	3,704	26,747	25,614	22,954	702	1,672
November	36,831	93,475	16,416	296	3,293	18,677	10,137	13,204	282	1,043
Total Year	340,469	1,283,600	158,503	5,035	36,492	206,064	333,228	118,208	3,799	14,365
Total for 1887 }	235,723	1,011,706	76,014	3,202	27,540	151,419	140,726	56,444	1,856	10,384

II.—TOTAL RECEIPTS AND SHIPMENTS OF STOCK FOR FIVE YEARS, 1884 TO 1888.

Years	Receipts				Shipments			
	Cattle	Hogs	Sheep	H & M	Cattle	Hogs	Sheep	H & M
1884—Aug., Sept., Oct., and Nov.	86,898	1,863	4,188	466	81,955	500	1,273	417
1885	114,163	130,867	18,985	1,959	83,233	71,919	8,408	1,415
1886	144,457	390,487	40,195	3,028	73,120	187,369	17,728	1,857
1887	235,723	1,011,706	76,014	3,202	151,419	140,726	56,444	1,856
1888	340,469	1,283,600	158,503	5,035	206,064	333,228	118,208	3,799
Total	129,710	2,818,523	297,885	13,690	595,791	733,742	202,061	9,344

III.—LARGEST RECEIPTS OF STOCK.

Largest Receipts on one Day.

Cattle, Sept. 19, 1887	5,802
Hogs, June 12, 1888	12,668
Sheep, Sept. 24, 1888	5,502
Horses and Mules, June 16, 1888	365
Cars, April 24, 1888	327

Largest Receipts in one Week.

Cattle, week ending Oct. 31, 1888	18,550
Hogs, week ending June 8, 1888	47,838
Sheep, week ending Sept. 13, 1888	10,976
Horses and Mules, wk. endg. June 23, 1888	478
Cars, week ending Oct. 31, 1888	1,315

Largest Receipts in one Month.

Cattle, Sept. 1888	52,060
Hogs, June 1888	179,903
Sheep, Oct. 1888	31,829
Horses and Mules, Oct. 1888	845
Cars, Sept. 1888	3,892

Largest Receipts in one Year.

Cattle, 1888	340,469
Hogs, 1888	1,283,600
Sheep, 1888	158,503
Horses and Mules, 1888	5,035
Cars, 1888	36,492

at times they are taxed to their fullest limit, yet as a rule the stock is well and carefully looked after. As the trains come rolling in, the Company take charge of the stock; and its location, name of firm to whom consigned, with description, &c., are detailed in the office of the Company. Practically speaking, all stock is consigned to commission men, who at once take charge of it. Sometimes the cattle are left in the pens where they are placed on arrival; but, as a rule, salesmen have each certain localities in the Yards, and endeavour to get all their cattle located in the same place. It may be said, before going further, that the Yards are divided into pens. The cattle-pens are in divisions, thus: division A, pen 1, or division C, pen 20; while the hog-pens are located at the railroad delivery points. Sheep have a separate location for themselves. The cattle-pens are of different sizes, holding from one animal up to 300 or 400 head. As a rule, local, or what are termed native, cattle, come in small lots, generally one or two cars at a time; while range cattle generally come in train-loads of 12 to 15 cars. A car-load averages about 20 cattle, weighing 1,200 lbs. each, or about 24,000 lbs. to the car. The hog- and sheep-pens are covered in. Hogs, weighing 250 lbs. each, run about 70 head to the car; while sheep are loaded according to weight, as they differ so much in quality. One hundred fair-sized sheep generally make a load. Each pen has a water-trough, while in those devoted to cattle and sheep hay-racks are also provided. The cattle-pens especially are exceedingly strong, the whole structure being of wood. The floors are of the same material, as it is most suitable to the climate. Alleys, well "macadamised," intersect the yards, so that every pen is easily reached, while at convenient points the weighing scales, the feed store-houses, &c., are placed.

On delivery, the Stock Yards Company become responsible to the various railroad companies for the freight and feed that are due for each shipment. In turn, the owner, through his commission men, becomes bound for payment to the Stock Yards Company. As it would be impossible to collect the freight as every car comes in, a settlement of freight and feed charges is made twice a week; the commission men being obliged to put up a bond of \$10,000, or 2,000*l.*, to secure the amounts that may accumulate. In this way matters run very smoothly. If the owner of the cattle has no bond up, he is obliged to pay the amount due before the stock is released; but so perfect is the system that no friction of any kind occurs, and the business in this respect goes on from day to day without any trouble.



SECTION OF THE CHICAGO STOCK YARDS LOOKING NORTH FROM MAIN VIADUCT TO THE EXCHANGE BUILDING.



Subjoined are the Regulations and Commissions of the Market:—

Diseased meats are condemned.

Sales, unless otherwise stated, per 100 lbs. live weight.

Dead hogs, 100 lbs. and over, $\frac{1}{2}$ c. per lb.; less than 100 lbs. of no value.

Broken-ribbed and bruised cattle, docked \$5 per head.

Public inspectors dock pregnant sows 40 lbs., and stags (altered boars), 80 lbs. each.

Yardage:—cattle, 25c.; hogs and sheep, 8c. per head. Feed:—corn, \$1 per bushel; timothy hay, \$30; prairie hay, \$20 per ton.

Commissions:—cattle, 50c. per head; calves and yearlings, \$10 per car; hogs and sheep, single decks, \$6; double decks, \$10 per car; public inspection of hogs, 15c. per car.

The charges for yardage are moderate, but the price charged for feed is out of all proportion to market values, and there is continual complaint upon this latter point.

The Stock Yards Company to a certain degree may be termed a monopoly, but their business is conducted upon a liberal basis, and, while they have made immense profits, little fault can be found with them. Acting as they do under a State Charter, they are subject to the whims, fancies, and depredations of the legislators of Illinois. It is true that monopolies such as these need to be kept in check, but the inside history of some of the legislation, both State and local, connected with the Stock Yards, reveals as venal a spirit in politics as ever disgraced the annals of any country. There is unfortunately in this country a class of men who think that brains and hard work should not have their reward, and that there should be a division of wealth periodically. This spirit pervades, unfortunately, the very threshold of our parliaments, and the popular demand at the present time seems to lead up to an attack upon the very foundations upon which a successful business is built up. Twenty-five years ago the Stock Yards Company was organised by a small band of men, who, seeing ahead, made a venture, which has grown, partly from location, partly from wise handling, into an immense institution. They made the venture, to-day they reap the reward; while thousands of live-stock breeders and feeders throughout the country have enjoyed the benefit of coming to a market in which they sell their cattle, hogs, and sheep for *cash*. The men who built up such a market deserve the credit, and, if there is any compensation in nature, they should be allowed to make some money for their energy and enterprise.

Four great parties meet, as it were, in communion every day at the yards: the Stock Yards Company, with its array of employes; the owners of stock drifting in from all points of the compass; the commission men, with their corps of clerks and assistants; and, lastly, the host of buyers who operate there.

As said above, buying and selling goes on every day except Sunday, while Saturday has come to be looked upon as a sort of settling day for the week. While, of course, cattle come in at all hours of the day, it is the object of the railroads to land them in the Yards from four o'clock to eight in the morning. A very large number of the cattle come out of first hands; but the majority are consigned by dealers, who pick them up in small bunches in the country, except in the case of range cattle, which are practically consigned by the owners. The hog market opens early, and is pretty well over by ten o'clock. There are scattering sales after that hour, but the majority of the work is finished at the above-mentioned time. The sheep market is confined very much to the morning also; while trading in cattle, as a rule, opens about nine o'clock and goes on more or less up till three p.m., when the whistle blows and business is suspended for the day. When it is considered that for the five active working days of the week we receive about 10,000 cattle a day, over and above hogs and sheep, the gigantic nature of the business can be estimated; but a man needs to be actually upon the spot to judge even approximately of how business is carried on. The Stock Yards Company employ about 1,000 men; there are about 120 commission men, who must also employ about 1,000 assistants; add to this about 300 buyers, and it can well be imagined that from eight o'clock in the morning till three in the afternoon the Stock Yards present a very active scene. There are, moreover, hundreds of owners who practically become interested spectators of the work as it progresses, while every day a great crowd of sightseers put in an appearance. The office-work is mostly confined to the Exchange Building, where the Stock Yards Company, the commission men, the railroad companies, the buyers, &c., have suitable offices. A substantial bank also occupies a very handsome office in the same building.

As soon as the cattle are delivered to the commission men, their work begins. Hay is immediately ordered for the cattle; quantities of course vary, but as a rule prime cattle eat about 5 lbs. each; common cattle, $7\frac{1}{2}$ lbs.; and range cattle get an allowance of 10 lbs. each. The water is turned into troughs, and if the cattle have been properly handled on the road, they take a good fill. Very often cattle have to be sorted and classed, and this, as a rule, is done before the water is turned into the troughs. As in other cattle markets both at home and abroad, supply and demand regulate to a great extent the price, and when the buyer appears early on the scene it is pretty good evidence of an active market. During last summer, when prices were 30 per cent. above those ruling at present, the buyers

would often be out at seven o'clock in the morning, whereas just now they seldom appear before nine. All cattle are sold by live weight, except in the case of milch cows or calves. The purchaser, therefore, has to be a better judge of quality than of quantity, but, as a rule, both the commission men and the purchasers are experts in regard to weight. After a long experience both in British and American cattle markets, the writer is decidedly in favour of the system followed in the latter. It is more satisfactory to the owner, better for the commission man, and the buyers seem to approve of the system also. The skill of the seller and buyer is in regard to the quality and not as to weight.

In the decimal system of currency and weights, the process of buying and selling is very easy, from a financial point of view. The commission man asks, say, \$4.00 per hundred lbs., the buyer bids \$3.80 per hundred lbs., and they eventually agree upon \$3.90 per hundred as the price, then the remainder of the work is very simple. Shortly after the terms are agreed upon, the cattle are driven to the scale and weighed. Before they are run into the weighing-pen, however, they are examined, either by the buyer himself or his agent, to see that there are no broken-ribbed or bruised cattle. Cattle that are severely bruised are, as a rule, thrown out and sold separately, while animals with broken ribs are docked \$5.00 per head, as stated above. The weighing scale in general use is known as the "Fairbanks Live-Stock Scale," and is an invention that has been of great value to American stockmen. These scales have capacity to weigh 100,000 lbs., which, at 2,000 lbs. to the ton, is 50 tons; but, as a rule, they seldom weigh more than 60,000 lbs. at a time. By this means an immense number of cattle can be passed over one scale in a day. The weighing beam of the scale is open to the public, and, as both the buyer and the seller have access to the room in which it is placed, no disputes ever arise as to weights. An official ticket of the weight is issued by an employé of the Stock Yards, who also superintends the weighing, and by this means all disputes are saved. After the weight has been ascertained the cattle are run off the scale, and they become the property of the buyer. The commission man takes possession of the scale ticket and hands it to his book-keeper, who calculates the amount due, and collects immediately from the buyer. The large buyers have arrangements with the bank to cash their tickets as they are handed in, and thus all the trouble of writing cheques, &c., is saved.

For simplicity and accuracy it would be difficult to improve upon the methods in use at the Chicago Stock Yards. Long years of experience, added to the natural inventive power of

the American, have built up a mechanical system in the Yards which it would be difficult to improve upon. Trading is carried on in a very businesslike way; there is little of that haggling met with in local English markets. More especially is this the case with the large buyers. They ride into the pen, glance rapidly over the cattle, make a bid, and, if the bargain is made at all, two or three minutes is all the time that is taken up. The sellers, of course, know the class of cattle each man wants, and consequently time is saved in this way—and in fact, as time is money, scarcely a moment is lost while active business is going on. The gossiping, incident to every business, is generally done in the afternoon in the hallway of the Exchange Building. Some of the largest commission houses handle from 200 to 500 cattle a day over and above hogs and sheep, and, as some of the buyers purchase as many and possibly more, it is easily seen that there is not much time to be wasted.

The classes of cattle coming to market are pretty well defined. We have, first, the "exporters"; this includes cattle that are suitable for the Eastern markets as well as good enough to go to England. Second, the "dressed beef" steers, suitable for the dressed beef business. Third, "butcher stuff," composed of light steers and the better grade of cows. Fourth, "canners," which includes everything not good enough for butchering; and then as an extra class we have the "range" cattle, which are pretty well divided among the last three classes named. Last season, for instance, many of the best "rangers" went to the dressed beef trade; but, as a rule, many of them are either put on to feed, or taken by the dressed beef men for a second grade beef; while an enormous number of them, and more especially those from Texas, are put into cans.

The prices ruling for all classes of cattle may be calculated from the following Table, taken from a market circular dated January 12, 1889:—

	\$	\$	s. d.	s. d.
Extra prime steers	5.25	to 5.50	= about	21 0 to 22 0
Exporters, 1,450 to 1,600 lbs. average	4.60	" 5.25	"	18 6 " 21 0
Good dressed beef and shipping steers, 1,500 to 1,400 lbs.	3.75	" 4.50	"	15 0 " 18 0
Fair to medium steers, 1,150 to 1,400 lbs.	3.50	" 4.00	"	14 0 " 16 0
Common to fair steers, 900 to 1,150 lbs.	2.75	" 3.30	"	11 0 " 13 3
Good cows and heifers	2.85	" 3.25	"	11 6 " 13 0
Fair to medium cows and heifers	2.20	" 2.50	"	9 0 " 10 0
Canners	1.25	" 2.10	"	5 0 " 8 0
Bulls	2.00	" 3.50	"	8 0 " 14 0
Good stockers and feeders	2.60	" 3.50	"	10 6 " 14 0
Common stockers and feeders	1.50	" 2.64	"	6 0 " 10 6
Calves, heavy, 300 lbs. and upwards	3.00	" 3.50	"	12 0 " 14 0
Calves, light, 100 to 180 lbs.	4.25	" 6.00	"	17 0 " 24 0

The prices quoted are about the lowest ever known in Chicago, and this is greatly owing to immense receipts. The average price, however, of the last ten years has ruled \$1.00 per 100 lbs. above present quotations. Take for instance good 1,400-lb. bullocks: the average price for these has been \$5.00 to \$5.10 per 100 lbs. during that time, or the price of such a bullock had been \$70.00 per head, netting to the owner probably an average of \$65.00, after paying freight, commissions, &c. To reduce it to English money, a 57-stone bullock of 14 lbs. to the stone is worth 14*l.* 8*s.* 9*d.* The American farmer west of Chicago has in round numbers received on an average about 13*l.* 10*s.* for his bullocks of this weight during the last ten years.

The movement of cattle is almost entirely eastward. San Francisco, which is a large market, draws quite a number of cattle from California and the adjoining States, but otherwise there is a continual movement toward the East. The movement begins at the Gulf of Mexico; the barren plains of Arizona, the sage brush valleys of Nevada and far Montana, all contribute and send forward their consignments. From those distant points the work of shipping is no easy matter. The various lines at suitable points have feeding-yards, where hay is supplied at three times its value. Cattle can be run from 300 to 500 miles without feed and water, but as a rule the feeding-stations are generally placed about the former distance apart. Within the last year or two "Palace" stock cars have been introduced, and by this means cattle can be run practically any distance, as they are constructed to allow the animals to be fed and watered without unloading. What are known as the "Street" cars, built on this principle, have up to this time been the best produced, and they are likely to maintain their lead, as they can be divided into three compartments, which to a great extent prevents bruises. The writer has repeatedly run cattle 1,300 miles in these cars, never unloading from the point of shipment till Chicago was reached.

The cattle having reached Chicago are sold as we have described above. Those which are bought for shipment are driven over to the shipping divisions, where they are loaded up and forwarded to their respective destinations. The dressed beef men generally allow their cattle to remain in the pens overnight, and the next day after they are purchased they are driven over to the slaughter-houses. The alleys in the yards have become so crowded that during the last few years viaducts have been constructed overhead, and along those the cattle and hogs are driven to the respective packing-houses.

The cattle having reached the point where they are made into dressed beef, a description of the methods by which three-fourths

of the cattle sold in the Chicago market reach the consumer may now be attempted.

Years ago, when the writer used to live at Berwick-on-Tweed, he saw the dressed meat business carried on in a small way at that place. A large local dealer used to kill from 500 to 1,500 sheep a week, and send them up to London for sale in the Metropolitan Meat Market. Handling even this small amount of stock was looked upon as quite a big business in that neighbourhood; but when we think that some of the large slaughtering-houses in Chicago put through three to four thousand cattle a day, the little wholesale butchering place at the old border-town becomes a pigmy in comparison.

The dressed beef business in America was founded some twenty years ago. A few years later the work was taken up by the late Mr. George H. Hammond, of Detroit, who may be termed the father of this business. He was a man of fine executive ability, and he built up through his energies a magnificent trade. He died, unfortunately, just when he had reached the zenith of his powers. Other parties took up the business, and it has gradually grown (figuratively speaking) from a grain of mustard-seed to a very large tree. Mr. T. Eastman, one of the largest live-stock shippers in America, branched off into this trade; Mr. Nelson Morris, well known to every cattle-man both at home and abroad, also took a hand; in 1880 Mr. G. F. Swift began upon a most extensive scale; while two years later Messrs. Armour & Co. also commenced the business. We have now in Chicago four immense concerns—viz. Swift & Co., Armour & Co., Hammond & Co., and Nelson Morris & Co. These firms, along with Libby, McNeill & Libby, buy a very large proportion of the cattle coming into our market. As facts speak for themselves, we took the liberty of propounding a series of questions to the various parties, and herewith we give the result:—

1. Number of cattle killed during 1888?

Answers: *Swift*, 815,031. *Armour*, 480,000. *Hammond*, 283,894.

2. Number of cattle slaughtered for dressed beef during 1888?

Answers: *Swift*, 678,896. *Armour*, 290,000. *Hammond*, 283,894.

3. Number of cattle slaughtered for canners during 1888?

Answers: *Swift*, 136,135. *Armour*, 190,000. *Hammond*, None.

4. Number of buyers employed?

Answers: *Swift*, 10 to 12. *Armour*, 7. *Hammond*, 7 to 9.

5. Number of men employed?

Answers: *Swift*, About 4,000. *Armour*, 5,000; this also includes men employed on pork-packing: probably 3,000 would cover beef employés. *Hammond*, About 900.

6. Some details as to wages and salaries paid?

Answers: *Swift*, Varies from \$1.50 to \$4.50 per day, according to skill of labourers; only the very highest class of skilled labourers

getting the higher amounts. *Armour*, Buyers, \$2,000 to \$7,000; expert butchers, \$4 to \$4.50 per day; helpers, \$3; labourers, \$1.75. Total cost labour our houses, \$2,500,000. \$700,000 per year for labour on beef. *Hammond*, Wages from \$1 to \$4 per day.

7. Number of cattle sold to the principal cities in the East?
Answers: *Swift*, During 1888, New York City, 117,908; Philadelphia, 60,178; Baltimore, 17,065; Washington, 10,195; Boston, 54,546. *Armour*, Philadelphia, 16,000; Boston, 30,000; New York and Brooklyn, 26,000. *Hammond*, 243,463.
8. Average percentage of dressed beef obtained in proportion to the live weight?
Answers: *Swift*, About 57 per cent. *Armour*, About 57 per cent. *Hammond*, 55 $\frac{1}{4}$ per cent.
9. Largest number of cattle killed in a day?
Answers: *Swift*, 4,528. *Armour*, Dressed beef, 1,710; canners, 2,300. Total, 4,010. *Hammond*, 1,449.
10. Average number of cattle killed per day?
Answers: *Swift*, In 1888, 2,612. *Armour*, About 1,600. *Hammond*, About 900.
11. Average cost of cattle?
Answers: *Swift*, In 1888, \$4.29, dressed beef only. *Armour*, \$4.25, dressed beef only. *Hammond*, \$4.13 per 100 lbs.
12. Average weight of cattle?
Answers: *Swift*, In 1888, 1,146 lbs., dressed beef only. *Armour*, 1,144 lbs. dressed beef. *Hammond*, 1,206 lbs.
13. Length of time cattle are in the coolers?
Answers: *Swift*, The rule is 48 hours. *Armour*, 24 hours. *Hammond*, 48 to 60 hours.
14. Cost of cars?
Answers: *Swift*, About \$1,400,000. *Armour*, \$850. Price of cars is governed by variations of market for material and labour; sometimes they cost \$1,000. *Hammond*, About \$850.
15. Number of cars employed?
Answers: *Swift*, About 1,600. *Armour*, 1,100. *Hammond*, 800.

The figures given by Messrs. Swift & Co. refer to all the cattle killed not only in Chicago, but also in their Kansas City and Omaha houses. The figures given by Armour & Co. only refer to this firm's Chicago house. They have a large establishment at Kansas City, and have just opened a house at Omaha. Messrs. Hammond & Co.'s statistics refer to Chicago and Omaha. This concern operates in both places. Morris & Co. made no returns, except to say that they slaughtered 392,000 cattle during the past year.

The cattle on reaching the slaughter-house are driven into large pens adjacent to it; thence they are driven along narrow passage ways, and are put into separate compartments by themselves. These compartments are just large enough to hold one bullock. Over them is a wooden foot-path, along which a man can walk; the animals are either shot down or felled from this point (see illustration, Fig. 1, on page 145). Between the compartments and the slaughter-house is a lifting door which slides up mechanically. A chain is passed round the horns of the animal, and it is dragged into the main slaughter-house; after which, the animal is properly bled. The remainder of the work

we copy from a description prepared by one of the packers for publication:—

Lifting-pulleys worked by steam-power are provided for hoisting each carcass while being dressed, and iron runs for moving the carcasses in halves or quarters from the hanging-room to the chill-rooms. All the work in the slaughtering department is done by well-trained experts, each one having a single division of labour to perform. For example: the hides are taken off the carcass by different trained experts in such careful manner as to give them a value of about 1c. per pound over the common butcher's hides; the guts are thoroughly cleansed and sold for sausage casings; the contents of the entrails are converted into fertilising substances, which are sold in the older portions of the country where the lands have been long worn by successive crops; the livers, hearts, &c., are shipped with the beef to different markets, where they are sold to good advantage; the bladders are dried and sold to druggists and other parties; the stomach makes tripe; the tongues are always in demand at good prices; the horns are sold readily to the comb and knife-haft maker; the shin-bones are usually in good request for knife-handles, and backs for tooth and nail brushes; the knuckle-bones are similarly prepared for making acid phosphate, and have a fair commercial value for this purpose; the blood is all utilised for different commercial purposes; the ox-tail trade is now a regular part of the traffic, as all the great hotels must have ox-tail soup at stated times; the heads, after being trimmed, are sold for glue stock; the fat taken from the inside of the bullock is made by a peculiar process into oleomargarine, which has to be sold under its proper name, and sells to fair advantage; neatsfoot oil is made from the feet, and the hoofs are ground and go in with the fertilising substances, so that every part of the bullock is utilised.

The processes of dressing and cleaning the carcasses are pictorially described in the illustrations, Fig. 2 and Fig. 3, on pages 146 and 147.

From the main slaughtering-house, which to a stranger is a sickening sight, the carcasses are taken along the iron run-ways into the refrigerators (see illustration, Fig. 4, on page 148). There they cool off in a temperature of about 36° Fahr. Passing from the blood-stained floors of the butchering department to the other portions of the house, every one is struck with the remarkable cleanliness of the establishment. There is not a speck of dirt. To this point the greatest attention is paid, and the meat and other products from these houses are handled with far more care than in the small slaughtering-houses in the country. From the coolers the carcasses are run out to the loading platforms, cut into quarters, and then put in refrigerator cars, which take the meat away and distribute it far and near.

A trip through the big slaughtering-houses is very interesting. The wonderful dexterity of the butchers, the mechanical inventions to help the work, the methodical system employed, the extreme cleanliness, and above all the rapidity and silence with which everything is done, strike a stranger very forcibly, and an impartial person who visits those great meat manufactories

Fig. 1.—Killing. (See page 143.)

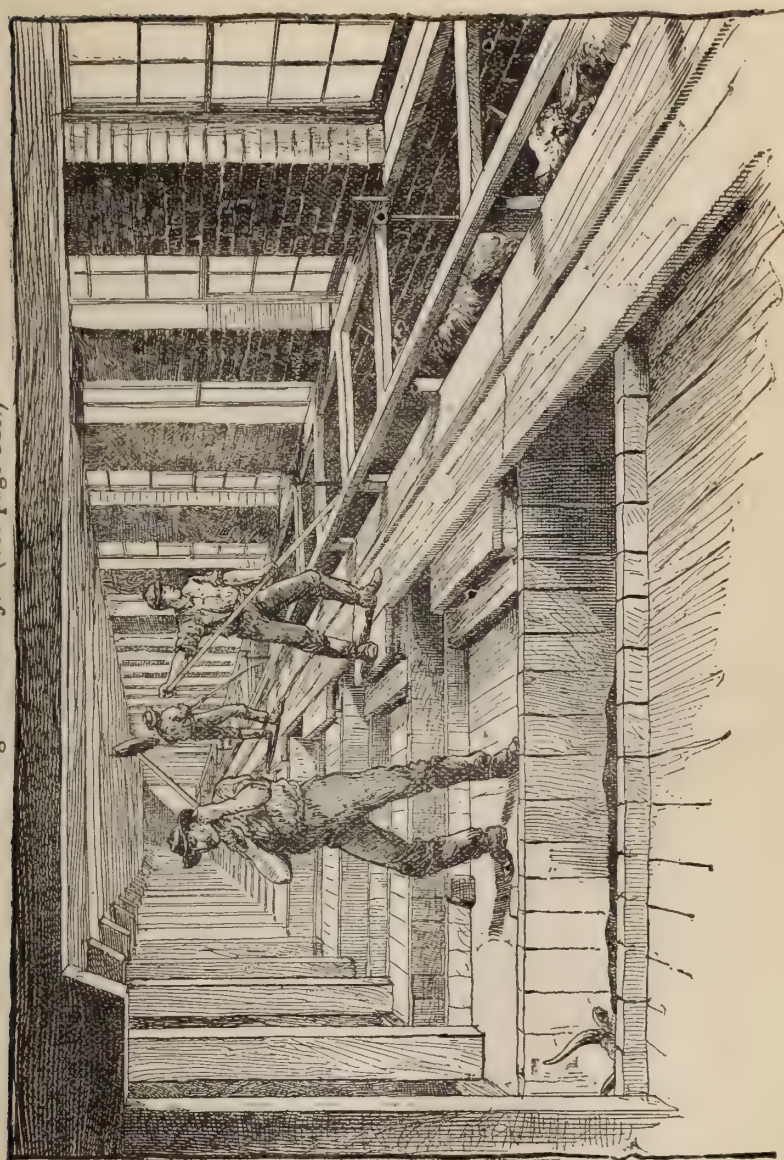


Fig. 2.—*Dressing.* (See page 144.)

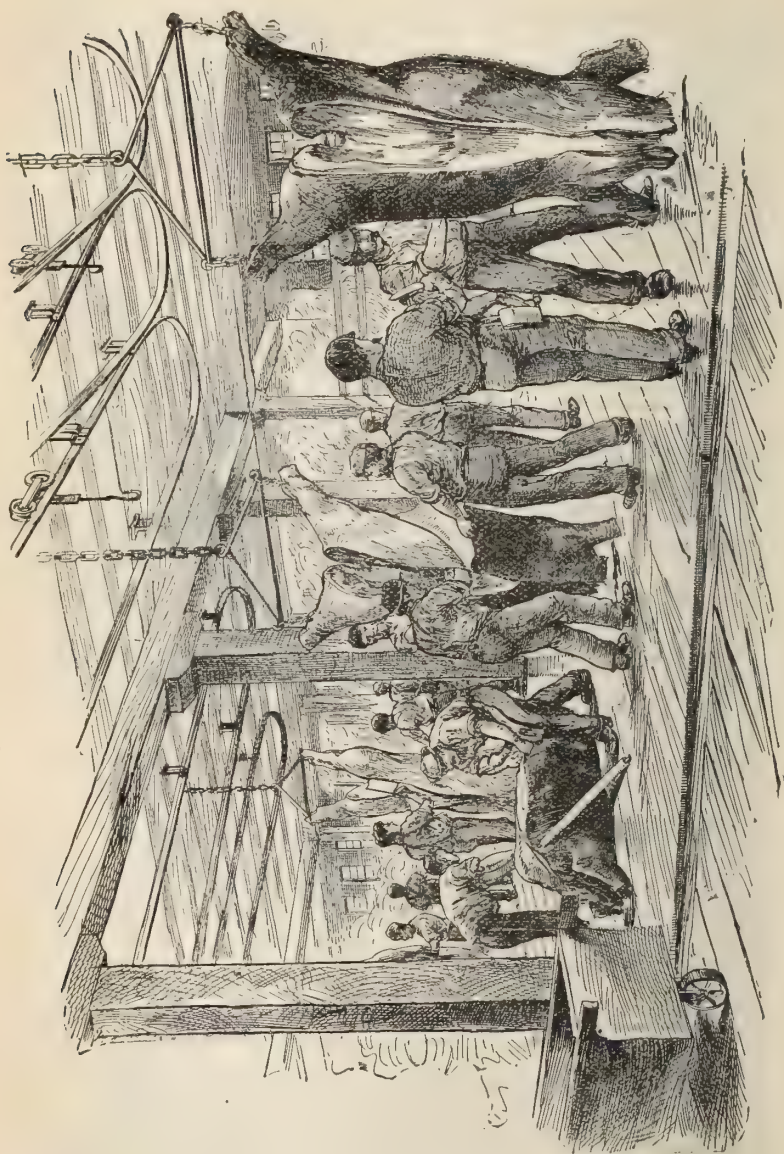


Fig. 3.—*Cleaning and washing carcasses before going to cooling-room.* (See page 141.)

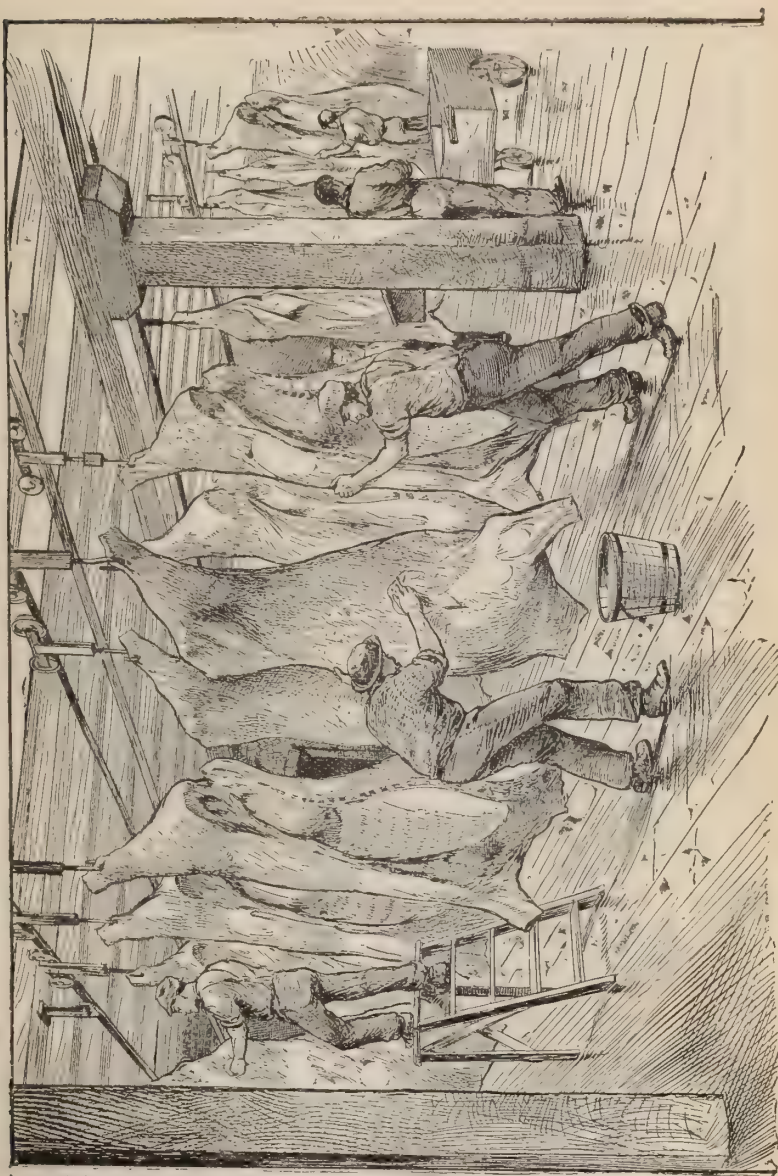
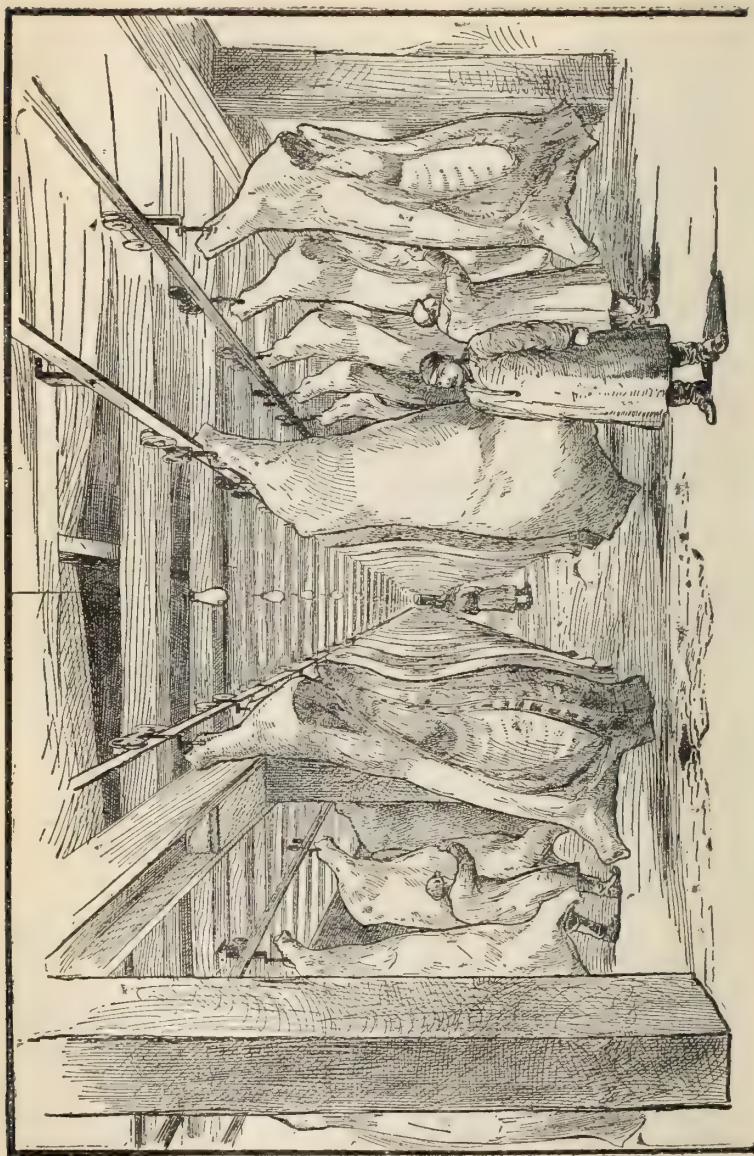


Fig. 4.—Cooling-room. (See page 144.)



generally comes away convinced that American ingenuity in this respect "beats creation."

American cattle markets differ from those in Great Britain, apart from their size, in two important points—namely, the cattle are sold by weight here, and the majority of the raw product is turned into beef, &c., by the dressed beef concerns. On the first point, the writer sees no reason for doubt that it is far in advance of the system practised in the older country. Opinions differ, however, very widely on the second proposition. The pivot upon which our great central markets swing at present is dressed beef. Not only is this the case in Chicago, Kansas City, and Omaha, but there are big concerns in New York devoting their attention to this business, while Boston and other points are following suit. The magnitude of the business, the rapid developments made, the amount of money employed, show that it has been successful so far as those connected with it are concerned.

The "Big Four," as the American press loves to call them, have got a hand on the cattle business that to the outsider seems full of danger. Popular opinion is against them, and their business has grown to giant proportions amid tremendous opposition—an opposition which is developing every day. Unfortunately for this opposition it springs from the retail butchers who have lost their trade. For the present at least, the squabble is a trade one, neither the consumer nor the producer taking much part. Some months ago the Butchers' Association met in conference with the Western range men and others to organise a determined fight on the dressed beef interest. The range men came to St. Louis, saw the butchers, and went home without taking any action. The butchers are now engaged in getting up bitter sectional fights in the different State Legislatures. They propose, so as to offset the power of the dressed meat concerns, to have all cattle inspected on foot before they can be sold by the local butchers: that in fact they wish to drive us back to the old system of shipping cattle alive from the producing portions of the country to the points where they were wanted.

The dressed beef men are willing now, as they always have been, to have National instead of State inspection. In this case it will be noticed that the consumer is not consulted. The butchers want, in fact, to get back their old trade, and they propose to legislate themselves back into power, and in doing so they propose to have a local inspector paid by the State Government at every little town; while the Western producer at least, and the dressed beef men, want National inspectors at the great central markets of the country. The butchers and their clique have

offered as an argument that a considerable portion of the cattle killed at Chicago and other points is diseased. This is a foul calumny, and it has turned effectively the Western interests against them. In the beginning of the fight—for it has existed for several years past—the sympathy of the public was with the butchers to a great extent, but recent developments show that the dispute is not got up entirely for the public good.

Leaving this question alone, as it is rapidly developing into a party fight, we propose to show why the dressed beef trade has increased so rapidly. The writer has probably as large an acquaintance and interest as any one in the cattle trade, being both a producer, a feeder, and also senior partner in a large commission house in Chicago, with connections in Kansas City and Omaha. Two reasons present themselves as in favour of dressed beef: first, Humanity; secondly, Economy.

Those two reasons hang together, but to a certain extent are separate. The first, without the second to follow and rest upon, would not give the average American or British cattle-man much thought, and yet at the same time the sentiment in the former appeals to nearly every impartial man. The system of trucking or "carring" is very similar in both countries. In England they load seven or eight steers to the truck or car, while in America about twenty cattle are put in a car. For the shipper the English way is much the better, while the railroad company benefits here. The Street Palace Car Company have partially adopted the English system by dividing their car into three compartments holding seven cattle each. But, whatever way shipping is done, it is brutal enough, and the animals suffer severely. Every mile saved, therefore, is less of cruelty to animals, and consequently an economy. In old days the cattle from Nebraska and further west were shipped to Chicago, a distance of 1,000 miles, or thereabouts; then they were loaded up again after being sold, and had another journey of 1,000 miles to the sea-board. Three-fourths of those cattle are now slaughtered at Omaha and Chicago, the carcasses being shipped forward. On the ground of humanity, the dressed beef business is at least a success. It saves the animals themselves from torture, and it is in this respect commercially a great economy.

A revolution of this kind in a single decade, or thereabouts, was sure to stir up a great fight by the vested interests which controlled the cattle trade, for not only were the butchers concerned, but the railroads objected seriously to having their freights cut down. A car of live cattle numbered twenty head, whereas a refrigerator car of the same size conveyed about thirty-eight head from Chicago to New York or any other objective point. The rail-

road fight is ever present. Sometimes it lies quiet for a month or two, but ever and anon it breaks out afresh, and in these days of active competition among railway managers it is a subject of frequent and fertile disputes. The rates, however, are equalised to a certain degree, so that the different railroads have not lost so much as is apparent at first sight. The dressed beef men, notwithstanding all those difficulties, have pushed ahead and placed their products practically in every town of any consequence in the continent. To have beaten the railroad corporations of this continent in many a pitched battle, to have cut off to a great extent the local butchers, is a work which must have the backing of something intrinsically strong and economical in its nature and progress. It is an old joke that when you are taken round the great packing-houses of Chicago your guide explains quite solemnly that the only thing wasted, so far as the hog is concerned, is the "squeal"; but as the steer has no squeal and bellows but little, we may say that nothing is lost under the methodical management employed. It has been shown how every portion of the animal is made use of. What chance has the old style of local butchering against this system? At the small country slaughter-house the blood ran away, often the head was partially neglected, the hoofs and shanks were thrown to the hog-pen, the entrails were sent the same road, and it was waste at every corner. To-day in Chicago this is reversed. From a national point of view a great gain has been made, and at least one of the products of the soil in this prodigal country is made the most of by this magnificent system. The offal can be worked off in large cities to great advantage, while on the very item of hides a considerable profit can be realised over the old plan. The hides are more carefully taken from the animal, and, accumulated in large quantities, they can be sold to better advantage. The hide-dealer can proceed to the slaughter-house and buy ten thousand hides at one deal, whereas it might take weeks to gather them up from the country districts.

But the dressed beef business can only subsist, in a wholesale way at least, at the great central markets of the country. The system is, to a great extent, an enlarged butchers' business, as it is supported by a host of retailers, who, instead of being butchers on the old style, have turned to meat-cutters. In San Francisco there are no butchers, the city draws its retail supplies of meat, &c., from a large class of meat-cutters, who buy their goods from day to day from the wholesale slaughterers. So it is with our dressed beef interest. They forward daily so much meat to the East, South, or West to be distributed at the different points where their goods are in demand. The work has to

go forward systematically, and they have to be prepared to supply their customers. It is on this rock that various schemes to supply dressed beef from some outside points have split.

As an example of this class of undertaking, we may instance the scheme started by the Marquis De Mores at Medora, Dakota. To the outsider it looked at first a plausible scheme. The intention was to draw on the ranch herds of Montana, kill the animals close to their grazing grounds, thus saving shrinkage, bruising, and railroad freights, and place the meat at a low figure in the East. The affair was badly managed and ended in disaster; but even if it had been run by the most experienced man in America, the result would have eventually been the same. The supply of beef lasted only for four months in the year, the remainder of the season the plant was idle. The meat was all of one class, no regular customers could be held, and the business gathered up, say, in four months' time was scattered to the winds when the supplies stopped. Labour was high and uncertain, and, lastly, the offal could not be used to advantage. The failure of this and similar schemes proves most conclusively that a dressed beef concern, to be successful, must be located at a central point, where it can draw a daily supply of all classes of cattle for its use, and where there is competition enough among the railroads to ensure moderate freights. Chicago and Kansas City of the Western markets are the only points where it has been absolutely safe to build an extensive plant, although Omaha during the last two years has secured cattle enough to ensure a steady supply for the dressed beef men there. While our great markets produced the dressed beef industry, they in turn are fostered and built up by it. Whenever we have other markets similar to the above of which we have been writing established, it is certain that a dressed beef plant will soon rise up beside them.

This industry is creating, as already mentioned, a revolution among the retail butchers' trade. The old-time butcher, with his great rosy countenance, no longer appears at market. He goes to the slaughter-house and picks out his meat from the refrigerators, or he contracts for a daily or weekly supply to be sent him. At outside points he calls at the refrigerator, where the meats are unloaded from the cars, and makes his purchases. A practical illustration of this revolution is worthy of record. Some years ago the writer was residing at Evanston, an important residence suburb of Chicago. The people who live there are of the wealthier class, and consume the best grades of meat obtainable. The principal butcher's shop was kept by an Englishman who understood his trade thoroughly. Every week he would come in to the Yards and take out a car-load of the

best cattle he could find, and slaughter them as required. He had to keep a trained butcher to kill and dress the stock; this man was idle part of the time, or had to work at some other vocation. The offal was partly thrown into the lake; the hides had to be shipped back to Chicago; and, further still, as the trade at this point only calls for fine meats, most of the fore-quarters and rough stuff had to be shipped back to Chicago for sale in a small dead-meat market there. The cattle were purchased, say, at $5\frac{1}{2}d.$ per lb. dead weight. Although he was receiving about an average of $9d.$ per lb. for his best cuts, still he had to sell his second-grade meats for $2d.$ to $2\frac{1}{2}d.$ per lb. He began to find that his competitors who did not handle a live bullock were getting ahead and he was falling behind. So he closed his slaughter-house, came down weekly to Chicago, not to purchase live cattle, but to go to the packing-houses, pick out his roasts, steaks, boiling pieces, his sheep and his hogs, and transfer them by freight up to his cooler or refrigerator at Evanston. The result was that he purchased nothing but what he could actually sell to advantage. He employed less capital, and carried on a larger business. He at once acknowledged that the change was for the better. His trade demanded the first grade of everything, while some butchers who supplied the lower grades would take the rougher meats. This example in a small way represents the changes that have and must take place.

The dressed beef business is a division of labour; it is a division of products; it is the coming method for handling our beef, and while it may not be the best method for the producer (although the writer thinks it is), still there is no doubt but that the consumer reaps the benefit, and cheap beef reaches every home in the country.

Competition is the life of all trade, and nowhere more so than in cattle markets. We have various central points bidding for cattle, and railroads endeavouring by every means in their power to direct and control trade. There are enough of railroads to insure, not only active, but aggressive competition in every part of the country; but in the Stock Yards proper, the fact that the dressed beef men buy about three-fourths of the cattle sold for slaughter at the home points is enough to seriously endanger the great principle stated above. Four or five great concerns buy the majority of the cattle, not only in Chicago, but at Kansas City and Omaha. The large houses whose statistics are quoted have established beef packing-houses at the latter cities—at least in three cases, viz. Swift & Co., Armour & Co., and Hammond & Co. The consequence is that they have a

preponderating interest in the market whose surplus supplies the Eastern and Southern States. The inference to be drawn from the above is the natural one, that competition is restricted; for what would be easier than a combination of interests?

Practically we do not find it so, except to a very limited extent, and for the following reasons:—(1) That the dressed beef men are active competitors in selling their goods at outside points. (2) That the privilege of carrying their produce is actively worked for by the various roads. (3) That there are outside buyers from New York, Boston, Philadelphia, Pittsburg, and Buffalo, who are always on the alert for any bargain. It is true, of course, that, with a greater supply of cattle than we have a demand for, the dressed beef buyers step in and depress the market very heavily; but this is the case in any other industry. As for instance, we have seen wheat, which is dealt in by the whole world more or less, where every combination to “corner” it has come to a disastrous end, go down far below its natural level because the supply was greater than the demand. In our cattle markets we have great periods of depression, and then again there is a reaction and prices are forced above their natural limit. The course of the market during the past year is an excellent example, as the price of cattle varied to the extent of thirty per cent. betwixt the highest and the lowest points of the year. In this great variation where were the dressed beef buyers? If they are such a power, why did they not hold prices down and keep the market at zero?

As the result of practical experience during the last eight years, the writer believes thoroughly that prices (in the Chicago Yards, at least) are the result of supply and demand. There are more or less local incidents to affect it, but gradually they are corrected and trade revolves in its proper cycle. To revert to 1888 as an instance, we find that the receipts in January, in comparison with the same month in 1887, were nearly 40,000 greater, and, as a consequence, down went prices. February, March, April, and May showed slight increases over the equivalent months in 1887; but the demand was also increased, and values stiffened at once. The month of June showed a decrease, and gradually the market, which had been surely and steadily advancing since February, made a decided advance, amounting to a “boom,” as we call it, and values were quoted at least thirty per cent. above the rates current in January. With moderate receipts in July and August and the first half of September, prices kept steady, fluctuating, of course, more or less from day to day. During those months we had very active competition

among our buyers, and it is evident in the light of to-day that prices went too high. On September 17 an unprecedented run of cattle commenced. At Chicago alone in two weeks we received 40,000 cattle more than our average number. The same pressure to market stock continued through October, and we entered the month of November with our market back to January prices or thereabouts. There is no market we know of so sensitive as the Chicago cattle market to the question of supply and demand. The dressed beef men and the shippers have their trade to supply from day to day, and any shortage causes an immediate advance. The salesmen and the buyers are not long in agreeing upon this point whenever the official numbers tell the tale.

The greatest complaint against the "Big Four" has come from the South-Western rangemen, whose cattle cannot be sold for dressed beef, and have to go into cans. The competition in this respect is very limited, and the prices obtained have gone down below the famine point. Still, it is a well-known fact that the storehouses are full of canned meat that cannot be profitably put into money, and prices, to compete with the outside world, will need to go down lower still. What we should have done with our low grades of beef without the dressed-beef men and the canning factories, is more than we can tell. They have opened countless foreign markets. They have sent their goods all over the world, and they have made a market for our meats where under the old system we could never have obtained a foothold.

The limit of this article does not allow us, nor would it be wise, to take up the export trade, both as regards live cattle and dressed meats; nor can we discuss the question of the price paid by the consumer for meat. Those subjects do not come exactly within the scope of American cattle markets; but we may point out that our live-stock markets are carried forward on a *cash* basis. The Stock Yards interest has the Chicago banks, with resources of 30,000,000*l.*, to draw upon. Large sums are also borrowed at low rates in the East; but the active daily financial work is put through two banks situated at the Yards—namely, the National Live-Stock Bank, which has a capital and surplus of about 175,000*l.* It has deposits of 500,000*l.*, with discounts or loans amounting to 400,000*l.* It has 600 active accounts on its books, and the overturn is from 400,000*l.* to 600,000*l.* per day. A staff of twenty clerks look after the business. The Drovers' National Bank has a capital and surplus of 60,000*l.*, with deposits of 150,000*l.*, and loans to the same amount. The former bank, however, does the active business of the Yards.

We have now fulfilled as far as possible the task imposed upon us in writing this paper. A labyrinth of subjects hang round it which could be written of, but space does not allow us to enter on new fields. In conclusion, we have still a few words to say on the general cattle business of the States. In 1850 we had but 17,000,000 cattle. In 1880, notwithstanding the War and the stagnation that ensued, we had more than doubled our cattle census: the account had swelled to 35,000,000, and at the end of this decade we shall have about 50,000,000 head. The great increase is in the West. While the States east of the Mississippi River had 15,000,000 cattle in 1850, they have only increased in forty years to 20,000,000. The States and Territories west of that river, with but 2,000,000 in the former year, have about 30,000,000 now. The increase in the East will not keep up with the population. In fact, it is doubtful if all over the country the human population is not growing more rapidly than the numbers of cattle; but every year there is a great advance in quality, while there are economies in consumption. Many of the fertile fields of the West are yet untouched. While the day when science must accompany agriculture has come in the Eastern States, yet it will be years before the black prairie lands of our Western domain will call for help from the brain of the chemist. Cheap food for ourselves and for other countries is assured for years, and though the price of beef at present is below the cost of production, it is only temporary. The counter-action will come, and money will be made as of old; but it is true that American energy and the Western march of civilisation will tend to give the consumer a better and at the same time a moderate-priced article, and for those reasons it is likely that Chicago, commanding a vast and splendid territory, will be one of the prime movers in the cattle trade of the world in the years to come.

VII.—*Fifty Years of Fruit Farming.* By CHARLES
WHITEHEAD, F.L.S.

AGRICULTURE generally has made the most astonishing progress during the last fifty years in respect of scientific applications, improvement of methods, and skill in management. In no previous fifty years has there been such an important and distinct advance in science and practice as that which is recorded in the volumes of the Journal of the Royal Agricultural Society of England, which has now been published for nearly half a century. A close examination of these volumes will show how

rapid this onward movement has been, and will prove how materially the Society, the outcome of the strong desire for agricultural progress, has contributed to it.

During this period, in common with all the other branches of agriculture, fruit-farming has greatly improved in respect of systems of culture, and has now become an important industry. The acreage of land under fruit culture has been very considerably extended. Fruit-farming is now recognised as a valuable branch of agriculture, whereas fifty years ago, except in the case of the Kentish cherry orchards and the apple orchards for cider-making in Devonshire, Herefordshire, Somersetshire, and Worcestershire, it was adopted upon a small scale, and not as an agricultural resource. There are no reliable records of the acreage of fruit land in Great Britain farther back than 1872, in which year, according to the Agricultural Returns, there were 169,808 acres. It is considered that there were not more than from 90,000 to 100,000 acres of fruit-land in 1839, mainly consisting of orchard land, planted with apples and pears, and, in Kent, with cherries. Then but little soft fruit¹ was grown, and that little in the neighbourhood of London, or within easy distance of London, and a few of the largest towns. On account of the difficulties of conveyance, perishable fruits, such as currants, gooseberries, and raspberries, were not much cultivated before railways were made. For this reason the principal produce of the apple and pear orchards in the western counties, and in Gloucestershire, Herefordshire, and Worcestershire, was made into cider and perry. The best sorts of trees for this manufacture were planted, and those for dessert purposes were practically ignored. Even in Kent a good deal of cider was made, not only because transport was tedious and costly, but also because the demand for apples was limited; or rather, it may be, that the markets to which they could be consigned were few, and their means of distribution excessively circumscribed. So it has come to pass that since the formation of railways many of the old apple orchards in Kent have disappeared, and cider-making has ceased in the land. Recently new orchards have been planted in various parts of this county with good sorts of apples, both for dessert and for cooking, to meet the undoubted demand for really choice fruit.

Cherries grown in East Kent were sent to London by road in vans and other vehicles. This necessitated relays of horses and travelling all night. There was always a certain market in

¹ "Soft fruit" includes strawberries, gooseberries, currants, raspberries, and blackberries, being of a soft and perishable nature.

London for these famous Kentish products, but for some years past cherries have been forwarded direct by the growers to many other centres of distribution than the London markets, and the Kent Fruit-Growers' Association have lately been considering whether they might not get better prices for their famous fruit by making arrangements to supply it direct to retailers.

The greater facilities of transport afforded by railways gave a stimulus to the cultivation of fruit, but it is only within the last thirty years that the chief increase in fruit orchards and plantations has taken place, and serious attention has been paid to them as a source of profit to agriculturists. It was seen that quantities of soft fruits were arriving from foreign countries which met with a ready sale, and that their distribution at reasonable prices caused a growing demand among classes by whom fruit had been regarded as a luxury far beyond their means.

It was felt that if strawberries could be sent in quantities and in fairly fresh condition from France they might be cultivated on a large scale in this country, at all events near large centres of population. Woodland was grubbed near London, in Kent, and strawberries planted. In other counties also near the metropolis and populous towns, fields were devoted to the growth of this fruit, the profits of which, taking an average of seasons, have been found to be satisfactory.

There has been also a large acreage of arable land planted with gooseberry and currant bushes, both red and black, since 1850, in several counties, notably Kent, Middlesex, Worcester, Gloucester, Cambridge, Lancaster, and Surrey. Before this there were plantations of these fruit trees in Kent and Middlesex, but they were only upon a comparatively limited scale.

Raspberries are grown now especially in Kent and Middlesex in large quantities, as the plants come to bear very quickly, and in some seasons handsome returns are made from them, though from the juicy and most perishable nature of the fruit there are not a few difficulties and losses occasionally. Tenant farmers having ordinary leases can plant raspberry canes without fear or risk, and this applies in a degree to the planting of all soft fruits. Where tenants could not arrange with their landlords as to compensation for planting fruit trees of a more permanent nature, they put in soft-fruit bushes alone, which begin to pay in two years and are exhausted in from nine to fifteen years.

But with fruit-growers who could make themselves secure with their landlords, a very favourite system of planting has been to set standard damson, or plum trees, with soft-fruit bushes. The latter begin to pay almost directly, and in three or four

years the standard trees begin to produce fruit. It will be found that a large proportion of the fruit plantations¹ made within the last twenty years is of this character.

Just now there is a tendency to change this. There is a slight reaction from the rush to produce soft fruits, as there have been gluts in the markets. Prices have not been so good latterly as in previous years. Foreign supplies increase, and home growers are just a little frightened. Seeing that there is always a demand at good prices for really fine fruit, there is a disposition to aim at producing quality, fruit of fine appearance and flavour, rather than quantity, common and cheap.

This is shown by the formation of orchards of approved kinds of apples, both for cooking and dessert, and the intention to bestow more care, not only in the selection of the best kinds, but also in the treatment of the trees and of the land, as well as in a better and more judicious system of marketing the fruit. It may be said in this place that radical changes in these directions are still imperative in the cultivation of apples, if English growers are to hold their own against American and Canadian producers, whose fruit, as a rule, is well grown, and is sent over comparatively uniform in size and quality, and can be depended upon by English consignees to arrive according to sample, or according to the specification. Great complaints have been made of the want of quality of the best English apples of the two last seasons. American and Canadian apples have been far better, it has been alleged, and have made better prices. This is due to bad weather to a great extent, also to the attacks of insects, which have in many cases spoilt the look of the fruit.² The American climate seems to be more suited to apple trees; the orchards, too, are in full vigour, not, as is the case with many of our English trees, old, and weakened by a long course of neglect or unscientific treatment.

It is the fashion to profess that the English climate has changed, that apples cannot be produced in the same perfection as they were fifty years ago; but the trees in many places are past bearing now, or far past their prime, besides having been suffered to be overrun by mosses and lichens, and crowded with boughs and branches. On grass-land apple trees had been supposed to require no manure. In plantations, the bushes under the apple trees have taken a great proportion of the manure

¹ A fruit "plantation" is land planted with standard fruit trees and bushes, and cultivated. A fruit "orchard" is land planted with fruit trees, and laid down with grass.

² The *Carpocapsa pomonana*, whose caterpillar burrows in apples, caused incredible mischief last season.

that has been applied before it could get down to their roots deeper in the soil.

During the last fifty years there has been a great neglect in respect of apple and pear culture. Fruit trees and bushes coming to bear quickly have been preferred before the trees of more tardy production. Where standard trees have been planted they have been generally plum or damson trees.

The apple and pear revival, which is just now undoubtedly taking place, is due to the appreciation of the fact that these English fruits are not what they should and might be, and that there is a good and steady demand for fine specimens. In districts suitable for apple and pear culture, tenant farmers see a prospect of a return eventually larger than can be obtained from ordinary crops. In the case of the trees being planted on grass land, there will be a certain yield from the grass until they begin to bear. Where the trees are planted with fruit bushes, there will be an early and, possibly, a considerable profit until the trees come into bearing. Landlords, since they have realised that tenants must not be restricted in the matter of cropping and cultivation in the present condition of agriculture, in some instances have afforded facilities to tenants for planting fruit trees, and have wisely encouraged this improvement of property. The success which has crowned the energy and skill shown pre-eminently by Lord Sudeley has induced other landowners to promote fruit cultivation in a liberal and intelligent manner.

Besides, in these late years the public have taken up the question of fruit growing. Many Conferences have been convened upon the subject, especially with respect to apples and pears. Exhibitions have been held at which incredible numbers of sorts of these fruits were shown, generally of splendid quality, proving that fine apples and pears can be produced with proper management.

The orchards in Devonshire and Somersetshire have remained almost stationary for the last fifty years, and even for a longer period. There are indications of awakening here and there on the part of the farmers. Very old trees are being replaced by young trees of approved sorts, but there is not by any means a general disposition to make a clean sweep of almost useless veterans, of whose bearing powers, in long past years, fabulous tales are narrated, and to fill their places with trees that will soon begin to bear. But little attention is paid in these counties to the production of fruit for eating or culinary purposes. Cider is the burden of the song.

Compared with other counties, the increase of fruit land in these cider-making counties has been curiously insignificant,

especially in Devonshire, in which there are now only 720 more acres than in 1872; or 26,485 acres in 1888, and 25,765 acres in 1872. The increase in Somersetshire is only 5,007 acres, which is small, considering its normal acreage, and far below the average increase of the other fruit-growing counties. Yet there must be much land in both these counties so favoured in soil and climate that would yield fruit superior to many of the apples imported from foreign lands. Upon some of the smaller holdings in Somersetshire where there is a sprinkling of trees of dessert and cooking sorts, fruit is sometimes sold. Among the dessert apples the Blenheim Orange grows remarkably well, and the "Fair Maid of Somerset" and "Tom Pot" are excellent varieties for cooking.

Herefordshire appears to be unfortunately in a somewhat similar category. The increase in its acreage of 5,253 acres since 1872 is not so large relatively as that of Somersetshire. Many of its orchards are in a most neglected state, though the soil is admirably suited for apple and pear production, and there are certain sorts of apples peculiar to its orchards, such as the old "Fox Whelp," which are unique, though many of the varieties found in them are very inferior. The little planting that has taken place in this county has not kept pace with the natural decay of the trees in the orchards. But little soft fruit is produced. A few occupiers have planted gooseberry and currant bushes to a limited extent. "Although," a practical Herefordshire farmer writes, "there is a larger acreage of orcharding in this county than in any other county in England, fruit-growing has been looked upon quite in a secondary light."

There are, however, indications of a revival. In several parts of the county trees have been grafted with good sorts, and "pot" fruit trees have been planted. The quantity of "pot" fruit, or fruit for sale for dessert and culinary purposes, has much increased in the last ten years.

Much has been done within the past ten years to improve fruit culture, especially that of apples and pears, in Herefordshire and Worcestershire by the Woolhope Naturalists' Field Club. Under the auspices of this society, and the editorship of the late Dr. Bull, the splendid work, the *Herefordshire Pomona*, was published, which contains carefully drawn and accurately coloured illustrations of the best apples and pears for table and cooking, and particularly for cider and perry making. Recently a small edition of this work has been published at a comparatively low price, within the reach of all fruit-growers. The efforts of this society have given a great stimulus to fruit-growing, having materially tended to improve the varieties of fruit

produced, and to help the commercial position of the fruit industry. In the same way the orchards of Normandy have been greatly benefited by the actions of the *Société Centrale d'Horticulture de la Seine Inférieure*, of which evidence is plainly given in their appearance with respect to pruning and general healthiness, also in their regular filling up with young trees.

Attention has been directed for some years to cider making, to the introduction of better processes, to the cultivation of varieties best suited for cider, to the erection of proper places for the storage of fruit, as well as for keeping the cider at a right temperature. Prices have increased with the demand for first-class cider in cask and bottle, also for second- and third-class cider, which is supposed to serve as the foundation of cheap champagne and other wines. Between 1830 and 1840 fine cider was worth from 1s. to 1s. 6d. per gallon, and common qualities made from 5d. to 10d. per gallon. At this time prices run from 1s. to 2s. per gallon for cider in the cask. Good bottled cider is worth from 9s. to 12s. per dozen. Second quality in cask makes from 6d. to 1s. per gallon. Perry is worth now from 4d. to 1s. 6d. per gallon, showing an increase of about 15 per cent. Higher rates hold for cider and perry from noted orchards and from the best varieties of apples and pears. It is stated that "Fox Whelp" cider has made as much as 30s. per dozen, and "Taynton Squash" perry 28s. per dozen.

In the condensed publication of the *Herefordshire Pomona*, before spoken of, it is remarked that

Herefordshire, Devonshire, and Somersetshire, and other districts capable of producing cider and perry of good quality, have a peculiar advantage in the possession of a branch of agricultural industry that may be made very remunerative. It is one the least likely to be interfered with by the fluctuations of ordinary trade, and has, therefore, with proper care, only the seasons to contend with. The present state of our legislature is most favourable to its extension, since there are no longer any restrictions upon its produce by taxation, nor yet on its sale direct from the orchards, whilst as regards foreign competition there is no probability that the supply for our home consumption can be seriously interfered with, for this, if for no other reason, that beverages which only contain so slight a proportion of alcohol are readily susceptible of re-fermentation caused by the constant shaking incident to conveyance from a distance.¹

In Worcestershire there has been an important addition to the acreage of fruit land. This is one of the cider and perry making counties, and a considerable proportion of its fruit acreage consists of orchards proper. Much more improvement has been made in these than in Devonshire, Herefordshire, and

¹ *The Apple and Pear as Vintage Fruits*, 1886, page 85. Hereford: Jakeman and Carver.

Somersetshire. Orchards have been replanted with approved varieties, or worn-out trees have been replaced by these; unprofitable sorts have been cut back and regrafted with more remunerative kinds. Farmers realise the importance of selecting good kinds, and plant only those they believe will be most remunerative; and it is found that however keen as business men they may be, an extra sixpence or two in the cost of a tree does not prevent them when they are assured of getting clean, healthy, well-grown trees that are true to name. Soft-fruit bushes have been planted in Worcestershire to some extent, both black and red currants and gooseberries. Black Naples, Lee's Prolific, and Carter's Champion are the favourite sorts of black currants. The red currant known as Trainer's Red Grape is preferred. Among gooseberries the Crown Bob, Lancashire Lad, Warrington, one of the most useful of the multitude of kinds, Whinham's Industry, and Keepsake are chiefly grown.

Plum-trees have been largely planted within the last twenty years in Worcestershire, notably in the vale of Evesham, the soil and climate of which are most suitable for their growth. They are set from 15 to 18 feet apart, with two rows of currant or gooseberry bushes between the rows of trees, and two or three bushes in the spaces between two trees. The principal varieties cultivated are the Pershore, Victoria, and River's Early Prolific, which have originated within the last fifty years. A damson or prune, known as Damascene, termed by Dr. Hogg the long damson, or the Shropshire damson, is extensively grown. A few cherry orchards have been made in the Evesham district. These have answered remarkably well, and there are many instances of excellent returns from some of them.

In the Evesham district there has been an increase of one-fourth in the acreage of fruit land since 1845. With reference to apple-growing in this part of Worcestershire, it is said that in spite of the many new sorts of apples now offered, the Blenheim Orange still stands pre-eminent, and the first question asked in offering apples for sale is, put in the vernacular, "Be 'em Blemmins?" The Blenheim Orange has in fact got a hold of the market possessed by no other sort. Among other varieties planted or grafted on old trees, are the Wellington, Warner's King, Lord Suffield, Tower of Glamis, Ecklinville Seedling, Golden Noble, Cellini Pippin, Beauty of Kent, Stone's Apple, and the handsome Worcester Pearmain.

A great advance has taken place in Gloucestershire in respect of fruit-growing, mainly since 1870. In this county there is a considerable acreage of orchard land, whose fruit has been used for cider-making, as in Worcestershire and Herefordshire, but,

generally speaking, this land is in a better state than that of these neighbouring counties. More attention has been paid to grafting trees with dessert and cooking varieties, and to replacing dead and worn-out trees by these; while the additions to the fruit land have consisted of orchards, planted with the best sorts of apples for general use, and of standard fruit trees with fruit bushes under them. And there has been a large addition to the acreage since 1872. In that year there were only 11,499 acres, and 16,169 acres in 1888. It may be said of Gloucestershire that it is one of the fruit-growing counties in which there has been progress, giving clear evidence of intelligent action, to bear much good fruit in the future. A good example has been given to the fruit farmers of this county by Lord Sudeley, whose plantations and orchards are model fruit farms, planted with the best varieties selected judiciously, managed in the most approved manner as to science and practice, and, it is believed, yielding a satisfactory profit. Lord Sudeley has indeed been a pioneer to landowners not only in Gloucestershire, but throughout Great Britain, in respect of fruit cultivation. His energy and success have done much to stimulate this industry and to improve the systems of culture.

Kent, with nearly 18,000 acres of fruit land, given in the Agricultural Returns under the head of "Orchards," &c., grows more fruit than any other county. Its acreage is not so large as that of Devonshire, Herefordshire, and Somersetshire, but a good part of it is planted with fruit bushes under standards both of which yield heavy crops. Important alterations have taken place in Kentish fruit productions in the past half century. Most of the old apple orchards have disappeared. When hops paid well, the apple trees were grubbed, and hop plants put in the fertile soil selected by careful husbandmen of the last century as especially suited for apples by reason of its richness, depth, and situation. It is somewhat exceptional to find an apple orchard, that is, a grass orchard, with old trees, in the "Garden of England." There are plantations, or cultivated fruit lands, upon which old apple trees can be found. Under these there are either filberts, cob-nuts, or soft-fruit bushes. Apple trees, as it was stated before, have been recently planted to some extent, but the production of apples is by no means so large as formerly.

Plums have been planted very extensively in East Kent, Mid-Kent, and parts of West Kent, with soft-fruit bushes under them. The chief sorts now grown are Victorias, Orleans, early and late Gisborne's Early Rivers, Belgian Purple, Magnum Bonum, Washington, Prince of Wales; and other improved plums, which have taken the place of such old kinds as Black

Jack and Mussel. Greengages are also much liked in East Kent, in the famous cherry district, but they do not thrive so well in other parts of this county. Damsons have been planted to an enormous extent, the variety known as the Crittenden having ousted all others. It is raised from suckers, and is a heavy cropper, coming to bear in four or five years. Its fruit is large and juicy, selling readily at high rates in most seasons. In 1886 there was some difficulty in selling this fruit. The crop of damsons, as well as of all kinds of plums, was abundant in an extraordinary degree, so that many were left upon the trees. Generally, however, the demand is equal to the supply, for jam manufacture and various fruit preparations. These trees have been put with soft-fruit bushes generally, and in some cases with cob nuts. Occasionally they have been placed between fresh planted apple trees, with soft-fruit bushes as well. As the apple trees get large the damson trees can be gradually removed.

Perhaps in no part of Kent has there been such a marked improvement in the management of fruit land as in the fertile tract lying between Chatham and Canterbury, where cherries flourish exceedingly, as well as many other kinds of fruits. Orchards have been filled up judiciously, and the land well manured. It had been thought by previous generations of cherry growers that nothing was taken out of the soil by the cherry trees, and that it would be sufficiently recuperated for the grass grown upon it by feeding it off with stock sheep. Many acres have been planted within the last twenty years with approved varieties, such as the Amber, Early Purple Gean, Elton Heart, Waterloo, Eagle Heart, Turkey Heart, Bigarreau, Napoleon, and other Bigarreaus, Florence Heart, with other good kinds.

Pears have always been largely and successfully cultivated in East Kent, but much change for the better has taken place during the past thirty or forty years with respect to selection of sorts, and a more rational treatment of the trees. On account of spring frosts this is a somewhat precarious crop, and it is singular that in the high and somewhat exposed situations in which East Kent pears are grown, these do not cause as much injury as in many other localities. Five sorts of this fruit are now raised, as the Pitmaston Duchess, Marie Louise, Louise Bonne, Beurré de Capiaumont. It may be said that this part of Kent is one of the chief sources of supply of pears to the metropolitan markets.

The culture of greengages, which thrive well here, has also received careful attention. Plums of the best quality are grown, and soft fruits of all kinds.

Nuts are a speciality of Kentish fruit productions. There

are certain spots, principally in Mid Kent near Maidstone, whose soil and situation are most favourable for their growth. Filberts were usually cultivated, but within the last thirty years cob-nuts have taken their place to a very large extent. These are not so delicate as filberts. The nuts are much larger and sell better, and better crops are yielded. Barcelona nuts have been planted in a few places. The cultivation of nuts has considerably increased, as there is a ready sale for them at rates ranging from 40s. to 105s. per cwt. A demand for these nuts has arisen in America, to which some consignments have been advantageously made. The crop is, however, rather precarious, the trees being liable to be affected by early frosts and injured by the caterpillars of two or three species of moths—the winter moth *Cheimatobia brumata* being a prominent offender.

There has been a large development of the fruit-growing industry in Cornwall within the past half century. This county is accredited with 5,100 acres of fruit land in the Agricultural Returns, and with the acreage of soft fruit grown by itself or in market gardens the total amount probably equals 5,500 acres. On account of its warm climate the Cornish fruit comes early to market, and therefore generally commands good prices. The centre of its cultivation is principally in the neighbourhood of Penzance. Among the fruits produced here are black currants, the bulk of which are consigned to Bristol for local distribution. Red currants, raspberries, and gooseberries are also extensively grown, and the fruit of these is very fine. The earliest English strawberries arrive in London from Cornwall, where much care and attention are paid to the sorts, and to the treatment of the land. Last year the first strawberries came from the Tamar district to London, and made close upon 2s. per lb. It is singular that plums do not grow well in Cornwall.

Of the other English counties with over 3,000 acres of fruit land, it may be said of Dorsetshire, with 4,265 acres, Monmouthshire, with 3,888 acres, Shropshire, with 3,900 acres, and Wiltshire, with 3,271 acres, that most of this acreage consists of apple orchards, and that there has been an increase in its extent of from 25 to 30 per cent. since 1839, and a considerable improvement in methods of planting and management of the trees and grass land within the last twenty years. In Shropshire damson culture has been much and skilfully developed.

Middlesex, with its acreage of soft fruit, described as "small fruit" in the Agricultural Returns of 1888, probably has 5,000 acres of fruit land. It need scarcely be said that in most cases the arrangement and management of this are exceedingly good. The change for the better that has taken

place in fifty years is very great. Early apples are grown in this county. Quantities of the best sorts of plums, well selected and well grown, supply the metropolis and distant markets; pears, though a fickle crop, are abundantly grown. Better sorts have been planted in many instances in the form of bush trees and pyramids. Strawberries and other soft fruits are extensively produced.

Among counties having smaller acreages, there has been extensive planting of soft fruits in Cambridgeshire, whose soil especially suits black currants, which are managed exceedingly well. In several districts greengages are well grown, and this comparatively modern culture is extending in the Royston, Meldreth, and Shepreth districts. Damson trees have been planted judiciously in late years. In Lancaster fifty years ago fruit-growing was unknown, save in gardens and a few plantations here and there. Now there are close upon 3,000 acres. Gooseberries have been for some years quite a speciality of Lancastrian cultivation. Many fine sorts originated there, notably the Lancashire Lad, Warrington, and others of equal value.

Many kinds of fruits are produced in quantities increasing year by year, and of improved quality, in Berkshire, Buckinghamshire, Hertfordshire, Oxfordshire, and Surrey—counties in which fifty years back fruit production was upon a very small scale. In other counties in which there is at present a small acreage, there is an apparent tendency to add to it, not merely by sticking in fruit trees and fruit bushes without regard to sort, and leaving them unpruned, neglected, and unmanured, but by planting with forethought, and giving proper attention to after-treatment. Gooseberries are grown in the fens of Lincolnshire with satisfactory results, and this cultivation is increasing year by year in this county.

Even in Scotland, whose climate would be thought quite unsuitable for fruit, there have been considerable additions to its acreage in recent years. Fifty years back fruit-growing for market was hardly dreamed of. Lanarkshire and Perthshire are the principal centres, having more than 2,000 acres between them, farmed in a highly skilful manner. Gooseberries are well grown there; strawberries also flourish exceedingly, though they are of course late. Many are sent in some seasons from Lanark to London.

In 1872, when the acreage of fruit land was first estimated and given in the Agricultural Returns of Great Britain, the total number of acres was 169,808. The returns for 1888 show that there were then 199,178 acres in Great Britain plus an inde-

finite number of acres planted with soft fruit, which may or may not have been included in the column giving the "acreage of arable or grass lands also used for fruit trees of any kind." It is most difficult to assess this. Looking at the large acreage of land planted with strawberries and raspberries, which would not of course be returned in this column, as not being "fruit trees," and considering that many fruit-growers would not return soft-fruit bushes as "fruit trees," it is thought that 15,000 acres should be added to the whole amount, making this stand at about 214,000 acres. This is by no means a satisfactory or sufficient increase, nor is the amount of fruit land in this country as large as it should be, seeing that fruit-growing does pay well, taking the average of seasons, if it is properly managed, and that there are many acres of land in the various counties of Great Britain that would grow fruit as well as those where fruit is now produced.

Allusion has been made to new systems and better methods that have been adopted in fruit culture in recent years. Among these may be placed modes of forming orchards on grass by putting the usual number of apple or pear trees, at the usual distances, and planting plum, damson, or greengage trees between them. By the time the former have obtained a good growth the latter will be past their prime and be removed. This has also been adopted to some extent in cherry orchards. Good manuring is essential to keep both sets of trees growing and producing.

Another form of plantation that has been practised is where standard plum or damson trees, or plum and damson trees in alternate rows, or by alternate trees of each kind, are put about 15 feet apart, taking 193 trees per acre—or 18 feet apart, taking 134 trees per acre. Under these gooseberry or currant bushes are set, $5\frac{1}{2}$ or 6 feet each way, requiring 1,440 and 1,210 trees per acre respectively.

Fruit bushes have been planted alone in many cases where occupiers of land have not capital enough to plant standard trees, or can get no assistance or assurance of compensation from their short-sighted landlord. Gooseberry bushes have in many such instances been planted either by themselves or with red currant bushes in alternate rows, 5 feet apart, or 1,742 trees per acre. Black currant bushes have also been planted alone, or with damson or plum trees.

In some localities, for example in West Kent, near London, large plantations of raspberry canes have proved very profitable. The canes are set in rows just wide enough to admit of cultivation between them, and about 15 inches between the stocks,

requiring no stakes. It is one of the leading jam and preserve fruits, being sent in tubs straight to the jam factories. From its perishable and juicy nature it is seldom sold for dessert purposes. Contracts are made with jam makers at prices ranging from 12*l.* to 30*l.* per ton. As many as two tons of raspberries have been grown per acre in favourable seasons, but this is altogether exceptional. In dry seasons the crop is sometimes very small.

Strawberry culture is a great feature of modern fruit production, at times very profitable, but most dependent upon influences of weather. There are growers who have 100 acres of strawberry plants. The approved method of planting upon strawberry farms is to put the plants in rows $2\frac{1}{2}$ feet wide, and about $1\frac{1}{2}$ feet from plant to plant in the rows, requiring about 10,500 plants per acre; or they are set $2\frac{1}{2}$ feet apart, from plant to plant and from row to row, in order that the horse-hoe may be used and manual labour saved. The best and earliest fruit is used for dessert purposes, and the later and indifferent quality goes for jam-making. As before shown, the earliest strawberries come from Cornwall. The Saltash and Tavistock districts of Devonshire send this fruit nearly as early. The sorts are Alice Maud, President, Paxton, British Queen. Next follows fruit from the Botley and Fareham districts of Hampshire, and from Sandwich in East Kent. From this last locality, strawberries sent to London on June 22 last season made 12*s.* per gallon.

Blackberries have been planted somewhat extensively lately, as there is a growing demand for blackberry jam. This fruit is very largely grown in America, from which country the improved varieties, bearing very large-sized fruits, have been imported. The modes of planting and treatment are pretty much the same as in the case of raspberries.

In the description of fruit-production in Kent, it was remarked that growers had discovered that cherry orchards require manure from time to time, and were now in the habit of supplying this. This applies to other fruit orchards, and to other fruit plantations, to which manure is now in many instances most liberally applied. There are still growers in the cider-making counties who do not believe that the apple and pear trees require any assistance whatever. Generally speaking, there has been a wonderful advance in this direction, which should be especially noted as constituting an element, and by no means an unimportant element, in the progress of fruit-farming. It has been found that the progress of canker is stayed by plentiful manurings, and other disorders to which fruit trees are liable are checked by liberal treatment.

The art of pruning has made a rapid advance in late years. Much information on this subject has been furnished by French writers, among whom may be named M. du Breuil¹ and M. C. Baltet. The necessity of pruning fruit trees has been now impressed upon the most old-fashioned and bigoted growers, and daylight has been let into many of the apple trees, through whose intertwined boughs and branches neither air nor light could permeate. Though a minor matter, yet of much practical import, staking young fruit trees now receives careful attention, and protecting them from stock and from hares and rabbits.

An entirely new system of growing fruit upon dwarf trees, or trees whose habit has been dwarfed by the nature of the stock grafted upon, has been very largely adopted by market-gardeners, by gardeners in private gardens, and to some extent by fruit-farmers. This system has the advantage of very early production of fruit, and, as a rule, of fruit of finer appearance and quality than that grown upon ordinary standards. It was first introduced into this country from France, where it is generally practised, and has been gradually extending in England since 1870. To produce these dwarf trees, grafts or buds of the desired sorts are worked upon the stock known as the Paradise stock, Pommier de Paradis, or upon the French Doucin stock. The first of these, the *Pyrus Malus præcox*, supposed to be a native of Russia, is said to be better for soils that are cool and wet, while the French Doucin stock is held to be better for dry soil. Trees formed upon these stocks have surface roots with many fibres running just below the surface, whereas in the case of the crab stock, and in the wild pear stock, there are long roots which run down somewhat deeply, being necessary to keep the standard tree firm and fast, and have but few fibres.

The advantages of these dwarf trees are that they come quickly into bearing, as they will produce fruit the second year, and can be easily pruned and cultivated; their fruit is fine and clear, and the crop larger and more certain than fen standards. No prettier sight can be imagined than a plantation of these dwarf trees in September, covered with ripening apples, or in May, with pink and white blossoms thickly set.

Pears are grown in this way with equal success upon quince stocks which have the same surface-rooting habits as the Paradise stock. The trees as well as the apple trees may be trained in pyramidal shapes or as ordinary dwarfs. Plums also are treated

¹ *The Science and Practice of Grafting, Budding, and Training Fruit Trees*, translated by Mr. Wardle from the French of M. du Breuil.

in this fashion with good results, and cherries are produced in abundance and of excellent quality from dwarf trees formed by working upon the Mahaleb stock.

Plantations are formed either of pyramids which are larger than the dwarf trees, or of the dwarf trees, planted separately in either case; or of pyramids or dwarf trees, with fruit bushes between them. Where pyramids are put alone, three hundred trees are required per acre. At first the intermediate spaces yield vegetable and other produce. The trees, however, come to bear in the third year. Some growers have planted pyramids of apples and pears in alternate rows.

If dwarf trees are set by themselves, about eleven hundred trees are required. This necessitates a large outlay for trees, but they bear fruit in the second year and should yield a considerable quantity in and after the third season. It is said that each of these trees would bear half a gallon in the third year, and that the fruit would be worth 14*l.*, taking its value at 4*s.* net, and the total crop per acre seventy bushels. In the fifth year it is expected that the produce would be doubled, giving 28*l.* per acre as the net value of the fruit.

Some enthusiasts upon the subject of dwarf trees hold that the fruit plantations of the future will consist of standard trees placed thirty feet apart and dwarf trees planted under them at the rate of eleven hundred trees per acre. The first outlay here would be very large indeed, but there would be a quick return from the dwarf trees. In six or seven years it would be necessary to take away the dwarfs immediately under the standards so as to leave the small trees twelve feet apart, which could be removed to form part of another plantation. It is asserted that a return of 120*l.* per acre would be made from such a plantation. This might be done in exceptional circumstances, but such an estimate cannot be accepted as representing annual average returns. This method of planting is good. It has not been adopted in any important degree, but it has much to recommend it.

For pyramids, or dwarf trees, the sorts that have been chiefly planted are:—*Dessert*: Gladstone, Duchess Favourite, Worcester Pearmain, Yellow Ingestre, Duchess of Oldenburg, Lady Sudeley, Sturmer Pippin, Peasgood's Nonsuch, Cox's Pomona, Cox's Orange Pippin, Irish Peach, Beauty of Kent, Baumann's Reinette. *Culinary*: Keswick Codlin, Lord Grosvenor, Ecklinville, Manks Codlin, Golden Spire, the Queen, Small's Admirable, Stirling Castle, Grenadier, New Hawthornden, Wellington, Stone's, Lord Derby, Bismarck, Winter Peach. The Blenheim Orange is also a good apple, and Warner's King.

Among pears for pyramids or dwarf trees, Louise Bonne, Pitmaston Duchesse, William's Bon Chrétien, Marie Louise, are the principal. But with regard to sorts of pears, as well as of apples, their selection must depend upon soil and situation. For instance, upon cold wet land such apples as Cox's Pomona and Cox's Orange Pippin and the King of Pippins have been found not to answer. Much more care has been taken to suit the sorts to their surroundings, and considerable knowledge has been acquired by fruit farmers upon this point at some cost.

Without endorsing the estimates of the profit to be derived from this system of fruit production from trees of dwarfed growth, many of which had been somewhat wild, there is no doubt that it is more profitable than the old plan of planting standards of slow growth. It may be taken that a few trees have yielded at such a rate as to show profits of 120*l.*, 90*l.*, and 50*l.* per acre. This must not be accepted as representing anything like an average profit upon acres, or even upon a single acre. All who grow fruit know the dangers to which trees are exposed, as well as that in some seasons one sort utterly fails while another yields well. Taking an average of years, it is believed that land planted in this way pays a fair profit if it is well selected and planted and well cultivated.

This system, besides being adapted for fruit farms upon a large scale, is admirably suited for small holdings, labourers' allotments and labourers' gardens—for small cultivators, in short, to whom fruit-growing would be a fertile source of income. In the fruit-growing districts this has been discovered by many of the working class who have planted fruit trees in their gardens, or who have been fortunate enough to get hold of little plots of fruit land.

As to profits generally of fruit land no reliable figures can be given. That they are satisfactory upon the whole may be inferred from the late extension of the acreage shown by the Agricultural Returns, and verified by the statements of leading nurserymen who have had large demands for fruit trees [and bushes of all kinds, particularly for standard apple, pear, plum, and damson trees, and for dwarf apple and pear trees. This demand has been to a considerable extent for trees of approved sorts; for it has been found that at almost all times and all seasons fruit of fine colour, shape, and quality is always saleable at good prices. A deal of nonsense has been written about fruit and fruit-growing lately by those who absurdly exaggerated the profits to be derived from this source, and recommend it as a panacea for agricultural depression, and by some, on the other hand, who take a gloomy view of British fruit-growing, and

altogether underrate its importance, and deny that it can be farther developed.

It is true that in certain seasons there has been over-production either of all or of some kinds of fruits, as in 1886, when it was difficult to sell a proportion of the soft fruit at any price. In that year many plums and damsons literally rotted on the trees. Had there been jam factories, or more jam manufactories, in the hands of the fruit producers, or closely connected with them, this waste would have been avoided. The fruit could have been made into jam, or pulp—that is, jam without sugar. Since that time several producers have made arrangements for making jam on their own premises, while there has been an important addition to the number of jam manufactories, so that it is believed that a repetition of the glut of 1886 will be avoided.

During the last season and that of 1887 it was said that apple production in this country could not pay, because American apples were coming over in abundance and of fine quality, and were making far higher prices than English apples. This was exceptional. The bad weather and the attacks of caterpillars spoil the quality of the latter, so that there was but little well-grown fruit. Among many well-informed persons the opinion prevails that really good English apples, especially of the choicer kinds, will always hold their own even against the best that come from the United States. Upon the whole, taking the average of the last ten years, it is believed that fruit-growing has paid far better than any other agricultural industry during that period.

Among the factors of the advance of fruit-farming in these later times there is none of more prominence than jam. It has been the fashion to sneer at jam; but the demand for it has enormously increased, and the jam, preserve, and essence-making industry is now of much importance, and will yet have a far wider development. In some branches it is only in its infancy.

The abolition of the duty upon sugar in 1874 gave a great impetus to jam-making, and consequently to fruit production. British jam-makers have a practical monopoly in respect of jam and of fruits preserved with sugar, or treated with sugar in any way, because sugar is from 40 to 65 per cent. dearer in all other countries, on account of the duties imposed upon it. Quantities of fruit are sent to Great Britain from America, but no jam. Desiccated fruits of all kinds are imported from that country, but none preserved with sugar.

- On account of this and the wonderful demand for jams and preserves, and the gradual increase in the exports of these commodities, jam manufactories have been established in many

towns, and old firms have enlarged their premises. Fruit-growers have also set up jam factories to take the produce of their own fruit land and that of the surrounding district. In some cases this has been done by co-operation. It has also been carried out by private enterprise. Lord Sudeley first originated the idea of a jam manufactory being a necessary adjunct to a large fruit farm. This has been followed by growers in Kent and elsewhere, who have found it most useful and economical to have an outlet for fruit that cannot be sold at market, or that would not make a paying or satisfactory price in the market. In these manufactories fruit is made into jam or preserve at once, or it is merely boiled down without sugar and put into hermetically sealed vessels, in which it may be kept for a long time. This is styled "pulp." When it is desired, this "pulp" can be made into jam by the addition of sugar. In Liverpool one jam manufacturer alone turns out 100 tons of jam per day in the season. A fruit-grower in a hop-growing county began boiling down plums in 1886, as he could not give them away. He made pulp of them at first, but was advised to add sugar, and found a ready sale for the jam. He utilised the boiler of an engine used for farm purposes and for drying hops upon a new principle, and in the last two years he has made 15 tons of jam daily during the season, which has been disposed of without any trouble.

Jam factories are suggested, after the fashion of American creameries and cheese factories, to which fruit may be consigned by the growers. These will, no doubt, soon be started, and must be of great advantage, and tend further to extend the production of fruit.

Fruit-drying, or the simple desiccation of fruit without any added sugar, has been advocated in the last two seasons. The machines for this are of American origin. Some were shown at the Royal Agricultural Society's Show at Nottingham, but not properly tried. They were also tried at Tunbridge Wells and Maidstone, but not exhaustively. Their principle is right, and the fruit dried thoroughly by them, after the fashion described by Mr. Pidgeon in the last number of this Journal,¹ is excellent, and exceedingly valuable for table purposes. Fruits of various kinds, apples, plums, apricots, dried in this way, courteously sent to myself and other members of the Council of the Society, at Mr. Pidgeon's suggestion, by Messrs. Michael Doyle and Co., of Rochester, N.Y., proved to be remarkably good when stewed

¹ "Fruit Evaporation in America," by Dan. Pidgeon, *Royal Agricultural Society's Journal*, Vol. XXIV. Second Series, Part II

or made into tarts or pies. They were so perfectly dried, all the saccharine matter being retained, that they were very nice to eat without being boiled or stewed. Though this has been tried on a small scale it has not yet been much adopted. The system offers another opportunity for the disposal of surplus fruit.

Fifty years ago almost all the fruit was consigned to London markets, or to the markets of a few large towns, or to markets near the places of production. It was sent direct to salesmen, who sold it to dealers, retailers, and costermongers. At that time the area of distribution was most limited. In the case of such a perishable commodity as fruit the slowness and uncertainty of transport caused a most circumscribed trade. The metropolis and two or three thickly populated centres were the only possible markets for fruit-growers upon anything like a large scale. At this time enormous quantities of fruit are still sent by growers to the various London markets, which now serve not merely as centres of distribution in and around the metropolis, but as centres from which fruit is distributed to all parts of the United Kingdom. Orders are received by telegraph for fruit from many markets in the kingdom where fruit runs short, which is despatched at once by fast trains. Growers now frequently, though London is their nearest centre, consign fruit direct to Manchester, Birmingham, or Liverpool, or other populous places, either as a speculation or upon telegraphic advice. They also make contracts with jam manufacturers to supply fruit during the season at fixed times and in defined quantities.

Lately the practice of supplying retailers, co-operative stores, and large establishments with fruit has been adopted by some growers with much advantage; as in the former case all expenses of commission are saved, while a certain sale is guaranteed, unaffected by temporary gluts which occur from time to time in centres like the London markets, into which the world pours its produce. Private customers are supplied in some instances by the growers. The parcel post has proved of much advantage in connection with this trade, especially in respect of the best kinds of out-door fruit and that grown under glass, the production of which has materially increased and is increasing steadily. Many growers look upon orchard houses and other buildings for growing early fruit as essential addenda to a fruit farm.

Very great progress has been made in the distribution of fruit in recent times, but there is still room for improvement. Fruit is always dear in some shops and in some towns—seaside towns for instance—and throughout whole districts, though at the same time markets are glutted and fruit is spoilt on the

trees: this happened actually in 1886. Added to this is the fact that in many towns and villages fruit is a luxury beyond the means of moderate incomes. Much has yet to be done in the direction of distribution. A year or two ago the growers of the famous East Kent cherries, feeling that the returns made by them were not by any means satisfactory or sufficient, agreed to try to sell their fruit by means of travellers, or agents, visiting towns and districts where fruit is known to be scarce and always dear. Mr. Tallerman propounded a plan to Kent growers of making arrangements with grocers and other tradesmen to take fruit direct. This question is receiving the careful attention of those interested in fruit production.

To railways is undoubtedly due in a degree the great development of fruit-farming. Facilities of transport have been afforded, absolutely essential in the case of soft, juicy, soon decomposing material; but the excessive rates charged for the conveyance of fruit have handicapped growers, and have tended to hinder the extension of the acreage of fruit-land in this country. As is well known, fruit is brought for less from France, Belgium, Holland, and other countries to London, than is charged for fruit carried there from Kentish villages. Enterprising farmers in Kent have chartered barges to convey their fruit to London, with decided benefit to their pockets. Some living within a reasonable distance from London have reverted to the old custom of sending it in vans by road.

So far, this has been, speaking generally, a chronicle of steady advance in modes of cultivation and details of management of fruit land and fruit. There is, however, one detail which has been somewhat neglected, and in the opinion of many it is of considerable importance. The packing of fruit and its "setting off" for market are not sufficiently attended to. The former is too much the same as in ancient days: baskets of the same type and capacity are employed. The latter is as a rule ignored. Here and there growers may be found who put fruit into smaller and neater baskets than the typical "sieves," "halves," and "pots," also into boxes. Some set off their fruit with coloured paper, and arrange it carefully in the packages, but much improvement is absolutely necessary in this direction. Sorting fruit for market has been more practised latterly. Generally it is sorted into "firsts" and "seconds," and, occasionally, growers very particular as to their reputation further divide it into "thirds." Not many years ago it was all heaped into baskets without any classification whatever.

Together with the increase of fruit produced in this country,

the importation of fruit from foreign countries has proceeded *pari passu*. Croakers prophesied some years back that the British fruit-growers' occupation had gone, and that they could not hold their own against foreign rivals living in sunnier and less capricious climes. The prophecy is repeated periodically, yet the fruit acreage increases, and from many quarters the farmers of this country are plied with exhortations to go on planting fruit, and encouraged by accounts of startling profits to persevere. It will be useful and not out of place to give here some statistics as to the importation of foreign fruit during the past fifty years. These, though somewhat incomplete on account of changes in the classification of various fruits, will serve to give a good idea of the extent and increase of this trade with foreign countries.

Taking apples first, in 1839 there were 71,162 bushels imported into this country; 323,719 bushels in 1849; 383,046 bushels in 1859; and 491,689 bushels in 1869. After 1870, and until 1882, apples were not classified separately. In 1882 the quantity of this fruit imported was 2,386,805 bushels of the declared value of 783,906*l*. In the last year, 1888, the quantity of this fruit imported was 3,796,592 bushels.¹

				Bushels
Of this quantity the	United States of America sent . . .			1,648,890
" "	Canada	" . . .		875,863
" "	France	" . . .		541,865
" "	Belgium	" . . .		384,989
" "	Holland	" . . .		137,917
" "	Portugal	" . . .		144,126
" "	Australasia	" . . .		29,908
" "	Channel Isles	" . . .		14,254
" "	Germany	" . . .		11,826
" "	Spain	" . . .		6,437

The remainder came from Italy, Denmark, Madeira, and other countries in very small quantities.

In 1886 about the same quantity of apples was imported from the United States as in the last year. Canada, however, has largely increased her exports of apples. In fact, the quantity sent in 1888 is nearly double that of any previous year, and is accounted for by the failure of the crop and the wretched quality of the fruit grown in England.

With regard to this, the remarks of Mr. McD. Allan, who represented Canada at the Colonial Exhibition in 1886, made to the Fruit-growers Association must be quoted:—

¹ These returns for 1888 were furnished by the courtesy of Mr. Courroux, chief of the Statistical Department of H.M. Customs.

"That exhibit of fruits at the Colonial Exhibition did more for our country than all the literature in the world. Our fruits told dwellers in Britain of a climate far superior to anything they had given Canada credit for. Some years ago I made the remark that I believed we could grow the finest apples in the world. My experience of Britain's markets, where I met apples from almost all other fruit-growing countries, has confirmed the impression. Our apples have taken the British buyer by storm, and consumers there will not purchase others so long as they obtain a suitable article from us. Canada has gained a good name for honest culling and packing. Another point I may mention here, that British apples are mostly cookers, and it is rare to find an apple there combining both cooking and dessert qualities. After visiting many orchards in various parts of Britain and discussing apple-growing with growers and dealers, I have arrived at the conclusion that British growers have become discouraged, and hence the fact that hundreds of acres of orchards are sadly neglected and in a state of decay. Apple-growing in England is rapidly waning, and there are some like indications throughout Europe."

It is feared that Mr. McD. Allan was not well informed as to the apple revival in this country, and did not taste any really good specimens of English apples.

As to the imports of other fruits, described as "unenumerated," "raw," the increase has been equally startling. In 1839 there were 69,740 bushels of raw fruit imported, not including apples, oranges, and lemons. By 1849 these imports had reached 124,262 bushels, and 263,997 bushels in 1859. The figures were 631,357 bushels in 1869. After this period there was a most hasty and extensive augmentation in the raw fruit importations, whose exact amounts it is difficult to arrive at beyond 1880 in consequence of altered classification. Since 1881 the quantity has varied between 1,166,318 bushels in 1887, the least in this period, and 3,039,060 bushels in 1888, the greatest in the period.

Of this unenumerated raw fruit Spain is the chief exporting country, France is next on the list, then follow Belgium, Holland, and Portugal in order. In considering the importation of this class of fruit, it must be borne in mind that it includes peaches, apricots, olives, cranberries, pines, pomegranates, bananas, grapes, melons, water-melons, shaddocks, and other similar kinds of raw fruit, which do not come into direct competition with British farm fruit either for table purposes or for jam-making. Large quantities of pears are also included in this unenumerated schedule which come in before English pears, and therefore do not directly compete with them. It is computed that not half of the unenumerated fruit imported enters into direct competition with the fruits grown by British fruit farmers. The competition of foreign producers is a serious matter to the fruit-growers of this country, and calculated to dishearten them, and hinder enterprise, if the bare figures of the importa-

tions of the last few years are put before them without explanation or qualification.

The question might also be asked, What is a "bushel" as applied to imported fruit? A bushel is, and must be, rather an indefinite standard of measure in respect of importations of indiscriminate fruits. It seems almost impossible to make comparisons between a bushel of melons, pines, shaddocks, or large pears, and a bushel of gooseberries or currants, and to make accurate calculations based upon an arbitrary term.

Except with regard to apples, the conclusion of the matter is that the invasion of foreign fruit need not at present fill home producers with dismay, considering the dense and increasing population of this country and the extraordinary growth of the taste of the multitude for fruit and jam. And as to apples, if more care is taken in their selection, cultivation, and keeping, it is believed that the best sorts will hold their own even against the finest Canadians that may be sent over. With reference to the demand for English fruit, it is held that a much increased supply would meet with a ready sale, if it were of good quality, and set off so as to attract the public, especially if there were a better system of distribution.

In spite of the large imports of fruit, the prices obtained for some farm fruits are certainly higher than when there was no supply from abroad and the acreage of fruit-land in this country was comparatively small. Apples, fifty years back, made on an average less money than at this time. From returns of prices made for apples in 1838, 1839, and 1840, upon a large fruit farm in Kent, it seems that the average price for the three years was 3*s.* 1*½d.* after the salesman's commission was deducted. The grower paid for the carriage, as the fruit was sent by road. It ought to be stated that the apple crop of 1840 was very large. The average price of apples "home to the growers" for the last three years would be at least 5*s.* per bushel.

In those days, when there was the least excess of supply over the demand, gooseberries when green made only 1*s.* 6*d.* per bushel, and ripe they were frequently sold at rates as low. In these present days, from 3*s.* 6*d.* to 5*s.* 6*d.* is about an average price. Plums also, according to the account of a long-established fruit salesman, were often sold at 2*s.* 6*d.* per bushel. Within the last six years plums have brought as much as 17*s.* per bushel, and cherries from 15*s.* to 26*s.* per bushel. Some farm fruits have not made very high prices since 1885, because of the enormous crops of 1886, and the late, dull, wet summer seasons, which always exercise a bad influence upon the sale

of fruit. Even in these, however, some fruits, as cherries, have maintained their value. In the last season they made good returns, as well as plums. Early fruits well grown make higher prices than were dreamt of in the philosophy of our forefathers.

It will be seen from this brief record of half a century of fruit farming that great progress has been made, and that this is continuing with rapid steps. There are many hundreds of acres of land in this country which would give a substantial profit, if judiciously planted with fruit-trees and fruit-bushes, and properly managed in all details.

VIII.—*The Composition of Milk produced on English Dairy Farms.* By Dr. Paul VIETH, F.C.S., F.I.C.

OF the enormous quantity of milk consumed by the inhabitants of the metropolis only an insignificant portion is produced by cows kept in London sheds. By far the greater part is derived from the country, and at least half the counties of England contribute to the supply. The milk received in London may therefore be fairly taken as representative of the produce of the herds kept on English dairy farms in general.

In my capacity as analyst to the Aylesbury Dairy Company, I have had quite exceptional opportunities of making myself acquainted with the composition of milk sent to London, not less than 84,746 samples of such milk having passed through my hands and been analysed in the laboratory under my charge, during the eight years from 1881 to 1888. The results of all these analyses form material of such great value and general interest, that I venture to submit them to the readers of this Journal.

If expressed in figures, these results would be but dry reading, and perhaps not convey much meaning to the mind of the reader. I have therefore prepared a number of diagrams so as to show at a glance the variations which occur and to permit of ready comparison. The data given are the percentages of Total Solids, Non-fatty Solids, and Fat, and they are given in monthly averages for the last eight years. The reasons why the three items named have been selected are easily explained:—the Total Solids include everything which is valuable in milk; the Fat must in several respects be considered the most valuable component part; and the percentage amount of Non-fatty Solids is of particular importance as being the most constant factor,

and therefore best adapted to serve as a guide to the genuineness and purity of the milk. A great number of complete milk analyses have shown me that the three component parts constituting the non-fatty solids vary but little in the relative proportions in which they are present, $\frac{6}{12}$ parts of the non-fatty solids being milk-sugar, $\frac{1}{12}$ part mineral matter (ash), and $\frac{5}{12}$ parts proteids or nitrogenous matter, rather more than two-thirds of the latter consisting of casein, the specific component part of cheese.

The first diagram, on pages 186 and 187, shows the average composition of all the milk received at the Company's premises at Bayswater. The number of farms from which the milk in question was supplied varied not only from year to year, but also during the different seasons. The results shown are means of analyses of morning and evening milkings. The most striking features which the curves indicate are the great uniformity of the non-fatty solids, and the rather large variations in the percentages of fat, which cause the total solids to fluctuate to about the same extent. Towards the end of the year, more particularly in November, the quality of the milk reaches its height, while in the spring months the poorest milk is received, another depression frequently occurring in July.

The explanation is this:—In autumn the majority of cows are stale, and they then give a limited quantity of milk, which is of high quality. In spring most of the cows are newly calved, and the fresh grass, forming a very succulent food, causes an increased flow of milk of a poorer description. In summer the cows frequently suffer from either excessive heat, which burns up the pasture, or continuous rain; and these unfavourable conditions are reflected in the production of milk, which becomes inferior both in quantity and quality.

The same remarks apply to the succeeding diagrams, on pages 188 to 201, which show the composition of milk received from several individual farms. Here a new item is introduced by giving the composition of the morning and evening meals separately. It will be seen that the evening milk is, with exceedingly rare exceptions, richer in every respect than the morning milk. I have always been inclined to ascribe this difference to the account of the inequality of the intervals between the two milkings; after the longer interval from P.M. to A.M. milking a larger yield of poorer milk being produced, and *vice versâ*. The milking times are stated to be 5 A.M. and 4 P.M., and the proportions of morning to evening meal vary from 100 to 94 in the case of farm E, to 100 to 78 in the case of farm A. The chief time for the cows to calve is from November to May, with

the exception of farm D, a so-called winter dairy, the time of calving in this case extending over September, October, and November.

The last diagram, on page 202, refers to milk produced by three distinct breeds of dairy cattle, viz. Shorthorn, Jersey, and Kerry cows, kept at the Company's estate near Horsham. Through the kindness of Mr. G. Mander Allender I am able to give the following details with regard to the management of the cows. The cows, as long as they are milked, are kept in well built, lighted, and ventilated sheds, affording 1,200 cubic feet air space to each animal. During the year 1888 the diet per head per day consisted of the following feeding materials:—6 to 16 lbs. hay chaff; 13 to 30 lbs. brewers' grains; 6 to 10 lbs. meal (chiefly oatmeal); 3 ozs. salt; further, from January to the end of May, and from the latter part of October to the end of December, 4 to 7 lbs. silage; from February to August 20 to 30 lbs. mangolds; from June to October 20 to 30 lbs. green fodder. The rations are so distributed that a Shorthorn cow weighing on the average 12 cwt. receives 26 lbs., a Jersey cow, weighing on the average 7 cwt., receives 15 lbs., and a Kerry cow, weighing on the average 6 cwt., receives 13 lbs. of dry substance in her food per day. The cows are fed at 5 o'clock in the morning; at 10 A.M. the mangers are swept clean and filled with water, which is kept turned on until 3.30 P.M., when it is run off to make room for another meal of food. At 5 o'clock the mangers are swept again, the water is turned on and left so over-night. Milking is proceeded with at 5 A.M. and 4 P.M. There is no particular time for the cows to calve, but it is arranged to have cows fresh in milk all the year round.

A striking feature of the last diagram is the difference in the composition of morning and evening milk, which is much larger than in the case of any of the farms previously mentioned. With this difference in quality there is a corresponding very large difference in quantity, the proportion between morning and evening meal being 100 to 72. I can find no other reason for this exceptional occurrence but the fact that the animals are without solid food and are supplied with water from 5.30 P.M. to 5 A.M. As to the different breeds, the Shorthorns—pedigree and dairy cows—do not call for special comment. The Jerseys were sampled with sufficient frequency only during the time from May 1887 to April 1888: the enormous richness of their milk is very interesting. As for the Kerrys, the high quality of their milk will, I expect, surprise many a dairy farmer.

The Composition of Milk produced on English Dairy Farms. 183

P.M. MEAL					A.M. MEAL				
Date 1888 ¹	Yield lbs.	Percentage composition			Date 1888	Yield lbs.	Percentage composition		
		Total solids	Non- fatty solids	Fat			Total solids	Non- fatty solids	Fat
Pedigree Shorthorn, No. 52.—Born, 16-1-84; Calved, 30-3-88.									
2-5	14½	13·7	9·5	4·2	3-5	18	13·0	9·4	3·6
31-5	13	13·2	9·4	3·8	1-6	18½	12·4	9·2	3·2
29-6	10½	13·1	9·4	3·7	30-6	16	12·1	9·2	2·9
24-7	12½	13·1	9·1	4·0	25-7	16½	12·3	8·9	3·4
19-8	9	13·2	9·1	4·1	20-8	15½	12·1	8·9	3·2
14-9	11	13·1	9·3	3·8	15-9	15	12·2	9·1	3·1
2-10	9½	13·3	9·3	4·0	3-10	13½	12·4	9·2	3·2
11-10	10½	13·5	9·8	3·7	12-10	14	12·5	9·5	3·0
5-11	8	13·9	9·2	4·7	6-11	13	12·7	9·0	3·7
29-11	7¾	13·3	9·2	4·1	30-11	10½	12·4	8·8	3·6
11-12	7	14·6	9·2	5·4	12-12	7½	13·0	9·0	4·0

Dairy Shorthorn, No. 68.—Date of Birth not known; Calved, 6-1-88.

6-2	17½	13·4	8·7	4·7	7-2	22¼	11·8	8·6	3·2
16-3	18	12·6	9·2	3·4	17-3	23	11·7	9·0	2·7
24-4	13½	13·1	9·2	3·9	25-4	20	11·8	9·0	2·8
31-5	13	13·8	9·1	4·7	1-6	16¾	12·7	9·0	3·7
29-6	10¾	12·5	9·5	3·0	30-6	18	12·2	8·9	3·3
24-7	11	13·1	8·9	4·2	25-7	15¾	11·9	8·4	3·5
19-8	8	12·6	8·9	3·7	20-8	15	12·2	8·6	3·6
13-9	8½	12·6	9·2	3·4	14-9	13	12·4	8·8	3·6
3-10	8¼	12·7	9·1	3·6	4-10	10	12·9	9·0	3·9
11-10	8	11·8	9·0	2·8	12-10	12½	11·7	8·3	3·4
5-11	6	12·9	9·0	3·9	6-11	9½	12·4	8·4	4·0
29-11	4¼	13·2	8·9	4·3	30-11	7	12·5	8·3	4·2
30-12	4	12·6	8·6	4·0	31-12	6	13·5	8·5	5·0

Dairy Shorthorn, No. 142.—Date of Birth not known; Calved, 29-11-87 and 3-11-88.

9-1	14½	13·2	9·4	3·8	10-1	16¾	12·5	9·3	3·2
17-2	10	12·9	9·2	3·7	18-2	15¾	12·7	9·1	3·6
27-3	13	13·1	9·3	3·8	28-3	16¾	12·5	9·2	3·3
8-5	11¾	13·4	9·4	4·0	9-5	14¾	12·8	9·1	3·7
12-6	12¼	12·8	9·1	3·7	13-6	15	12·6	9·0	3·6
12-7	10¼	13·4	9·3	4·1	13-7	13	12·8	9·1	3·7
3-8	8	14·0	9·5	4·5	4-8	10	13·1	9·2	3·9
4-9	8	13·5	9·3	4·2	5-9	9½	13·2	9·0	4·2
28-11	8½	13·0	9·2	3·8	29-11	10	12·8	9·1	3·7
21-12	7½	12·8	9·2	3·6	22-12	8	13·1	9·1	4·0

Dairy Shorthorn, No. 205.—Born in 1884; Calved, 23-10-87 and 25-8-88.

11-1	12½	13·8	9·3	4·5	12-1	14¼	12·2	9·1	3·1
20-2	9¾	13·8	9·4	4·4	21-2	10¾	12·5	9·4	3·1
29-3	7½	12·8	9·5	3·3	30-3	9	12·7	9·3	3·4
6-5	7½	14·4	9·3	5·1	7-5	9	12·6	9·1	3·5
14-9	11	13·0	9·7	3·3	15-9	14	13·0	9·5	3·5
3-10	11	13·7	9·0	4·7	4-10	13	11·6	9·1	2·5
23-10	13½	13·7	9·2	4·5	24-10	14¼	12·3	9·1	3·2
13-11	10¼	14·0	9·2	4·8	14-11	11¼	12·2	9·2	3·0
5-12	8½	13·8	9·3	4·5	6-12	10	12·0	9·2	2·8
27-12	7½	13·9	9·2	4·7	28-12	9	13·8	9·3	4·5

¹ The first figure in the date column gives the day of the month, and the second the number of the month (*e.g.* 2-5 = 2nd May).

184 *The Composition of Milk produced on English Dairy Farms.*

P.M. MEAL					A.M. MEAL				
Date 1888 ¹	Yield lbs.	Percentage composition			Date 1888	Yield lbs.	Percentage composition		
		Total solids	Non- fatty solids	Fat			Total solids	Non- fatty solids	Fat
Jersey, No. 105.—Born, 28-5-82; Calved, 12-5-87 and 25-4-88.									
12-1	4½	13·8	8·9	4·9	13-1	6	13·2	9·0	4·4
22-2	3¼	14·1	8·9	5·2	23-2	4¼	13·6	8·8	4·8
10-6	12	13·5	8·8	4·7	11-6	18	13·0	9·0	4·0
21-6	10	14·9	8·8	6·1	22-6	13½	13·7	8·7	5·0
17-7	12	14·6	8·9	5·7	18-7	13½	13·1	9·2	3·9
2-9	6½	12·9	8·5	4·4	3-9	10½	13·2	8·9	4·3
21-9	7½	14·5	8·7	5·8	22-9	10	12·5	8·8	3·7
16-11	5	13·6	9·2	4·4	17-11	7	13·0	9·1	3·9
7-12	4½	13·7	9·2	4·5	8-12	6	13·1	8·9	4·2
30-12	5	13·5	8·9	4·6	31-12	6	13·0	8·8	4·2
Jersey, No. 110.—Born, 25-4-81; Calved, 22-2-88.									
2-4	10¼	15·2	9·6	5·6	3-4	14	13·8	9·7	4·1
1-5	8½	14·7	9·7	5·0	2-5	13¼	13·4	9·6	3·8
7-6	8½	14·2	9·6	4·6	8-6	11¾	13·4	9·1	4·3
31-7	6½	14·7	9·5	5·2	1-8	8	13·4	9·4	4·0
31-8	6	14·8	9·6	5·2	1-9	8	14·2	9·4	4·8
26-10	6¼	15·5	9·7	5·8	27-10	8½	14·3	9·6	4·7
Jersey, No. 117.—Born in 1881; Calved, 20-5-87 and 7-5-88.									
12-1	8½	14·9	9·6	5·3	13-1	11¼	13·7	9·4	4·3
21-2	5	15·4	9·8	5·6	22-2	7	14·1	9·6	4·5
24-5	14	16·2	9·4	6·8	25-5	22½	14·1	9·5	4·6
22-6	9¾	12·7	8·6	4·1	23-6	16¾	11·3	8·3	3·0
17-7	11	13·6	8·9	4·7	18-7	17½	12·5	9·0	3·5
9-9	10	13·5	8·9	4·6	10-9	13½	12·3	9·0	3·3
26-9	10	14·0	8·9	5·1	27-9	8	11·0	9·1	1·9
22-10	7	14·0	9·0	5·0	23-10	8	11·3	9·1	2·2
21-11	6	14·7	9·2	5·6	22-11	6¾	12·5	9·0	3·5
16-12	4¼	14·7	9·0	5·7	17-12	7	14·0	9·1	4·9
Kerry, No. 155.—Date of Birth not known; Calved, 29-5-88.									
15-6	9½	15·2	9·0	6·2	16-6	12	13·2	9·0	4·2
28-6	12	15·3	9·2	6·1	29-6	15½	13·8	9·1	4·7
25-7	10	14·2	9·2	5·0	26-7	15	13·5	8·9	4·6
20-8	7½	12·7	9·3	3·4	21-8	14¾	13·4	9·0	4·4
13-9	10¼	14·7	9·3	5·4	14-9	13¾	13·8	9·0	4·8
2-10	8½	13·7	9·4	4·3	3-10	10½	13·6	9·5	4·1
14-10	8¼	14·1	9·3	4·8	15-10	13¼	13·7	9·5	4·2
5-11	7	15·1	9·1	6·0	6-11	9	15·3	9·1	6·2
28-11	5½	15·7	9·3	6·4	29-11	7½	13·4	9·2	4·2
17-12	5½	16·6	9·1	7·5	18-12	6½	14·6	9·1	5·5
Dexter Kerry, No. 168.—Date of Birth not known; Calved, 15-5-87 and 3-7-88.									
29-1	5¾	14·3	9·6	4·7	30-1	10	13·6	9·7	3·9
9-3	6	15·8	9·8	6·0	10-3	7	15·0	9·8	5·2
24-8	10¼	13·7	9·1	4·6	25-8	16½	12·9	9·0	3·9
10-9	9½	13·1	8·9	4·2	11-9	11½	13·8	9·0	4·8
18-10	9½	13·3	8·6	4·7	19-10	12	12·3	8·7	3·6
9-11	8½	14·1	9·3	4·8	10-11	12	13·0	9·3	3·7
22-11	7¾	12·8	9·0	3·8	23-11	12	12·4	8·8	3·6
19-12	7½	13·8	8·8	5·0	20-12	11	12·2	8·6	3·6

¹ The first figure in the date column gives the day of the month, and the second the number of the month (*e.g.* 2-5 = 2nd May).

P.M. MEAL					A.M. MEAL				
Date 1888 ¹	Yield lbs.	Percentage composition			Date 1888	Yield lbs.	Percentage composition		
		Total solids	Non- fatty solids	Fat			Total solids	Non- fatty solids	Fat
Dexter Kerry, No. 192.—Date of Birth not known ; Calved, 2-12-87.									
31-1	9 $\frac{3}{4}$	13·7	9·3	4·4	1-2	13 $\frac{1}{4}$	12·6	9·1	3·5
11-3	10 $\frac{1}{2}$	15·1	9·2	5·9	12-3	14 $\frac{1}{4}$	12·3	9·2	3·1
20-4	10 $\frac{1}{2}$	14·5	9·4	5·1	21-4	13	12·8	9·1	3·7
28-5	9 $\frac{3}{4}$	14·5	9·7	4·8	29-5	12 $\frac{1}{2}$	12·6	9·4	3·2
25-6	8	13·5	8·9	4·6	26-6	10 $\frac{1}{4}$	12·6	8·6	4·0
22-8	7	13·7	9·0	4·7	23-8	8	12·4	8·6	3·8
28-9	6 $\frac{1}{2}$	13·3	9·0	4·3	29-9	8	12·6	8·8	3·8
19-10	6	14·4	9·4	5·0	20-10	9	13·3	9·2	4·1
9-11	5 $\frac{1}{2}$	13·8	9·4	4·4	10-11	8 $\frac{3}{4}$	12·7	9·2	3·5
22-11	6	13·9	9·2	4·7	23-11	8	12·7	8·9	3·8
19-12	4 $\frac{1}{2}$	14·2	9·3	4·9	20-12	8	13·1	9·1	4·0

¹ The first figure in the date column gives the day of the month, and the second the number of the month (*e.g.* 2-5 = 2nd May).

So far nothing has been said about the quantitative yield of milk, a factor which by many will be considered of higher importance than quality. If possible, the two ought to be considered together, which is the case in the tables on pages 183-85, showing the variations which milk undergoes during the period of lactation. As space permits of only a very limited number of specimens being given, I must refrain from drawing definite conclusions from them.

In conclusion, I wish to draw attention to the great stability of the specific gravity of milk, which in the case of the mixed yield of a number of cows rarely falls outside the limits of 1·030 and 1·034 (water=1·000). Looking at the considerable variations, *e.g.* between Shorthorn and Jersey milk, this seems curious enough, but finds a ready explanation in the fact that the higher percentage of fat, which tends to lower the specific gravity, is generally accompanied by an increased amount of non-fatty solids, exercising an influence in the opposite direction. In the case of milk of individual cows one would naturally expect larger variations, and they certainly do occur. However, among the 1,652 samples of Shorthorn, Jersey, and Kerry milk upon which the diagram on page 202 is based, there are only 50 samples of specific gravity below 1·030, and only 73—notably Jersey milk—of specific gravity above 1·034. By far the greater number of these exceptional specific gravities are not lower than 1·029, nor higher than 1·035. The lowest and highest figures observed were 1·0240 and 1·0365 respectively.

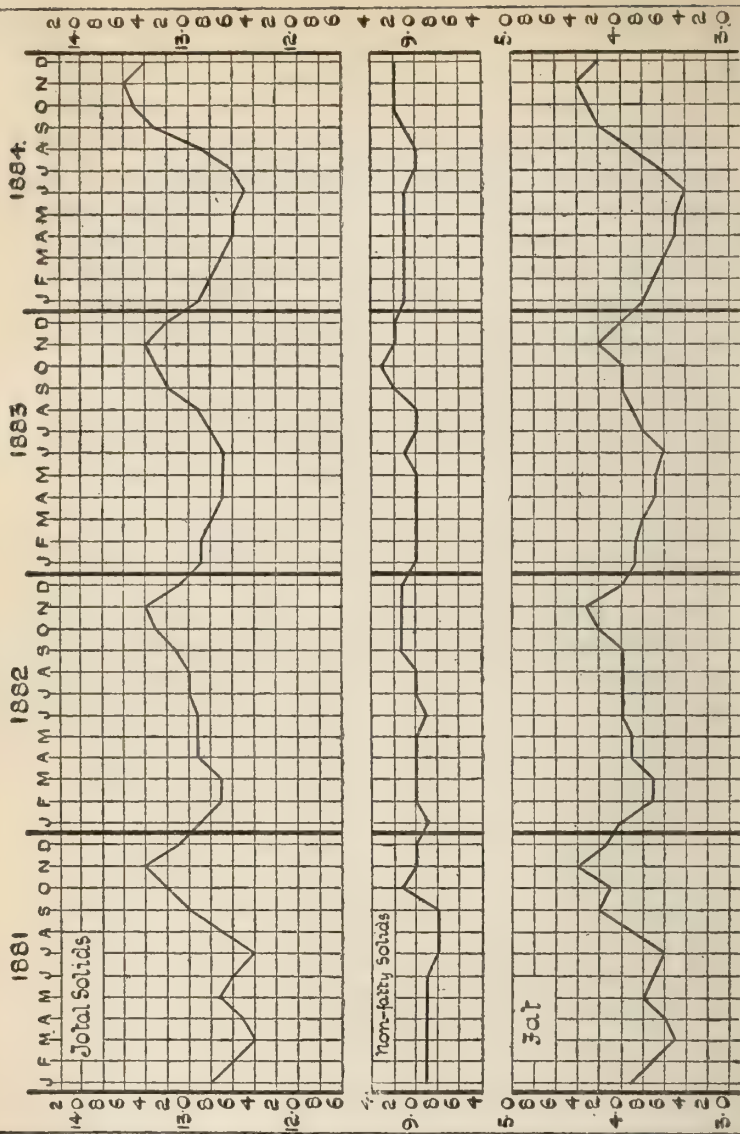
Average Composition
of milk
received from
50 to 50

307ms

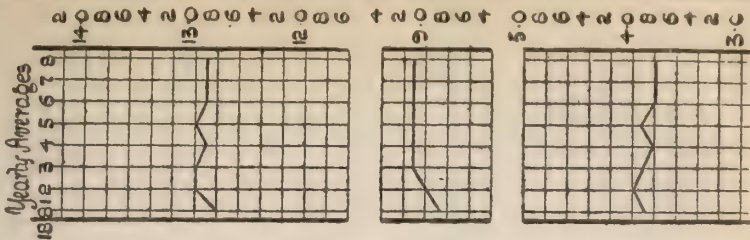
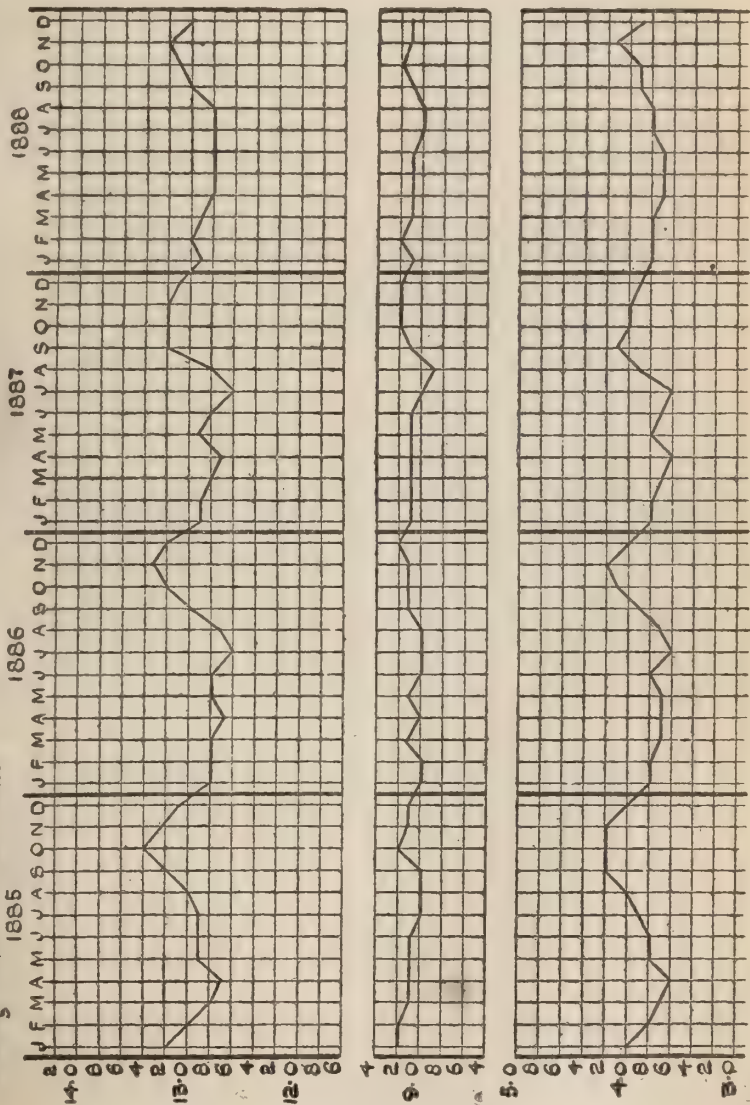
Total Number of

Analyses

84746.



Average Composition continued



farm A

situated in Berkshire.

30

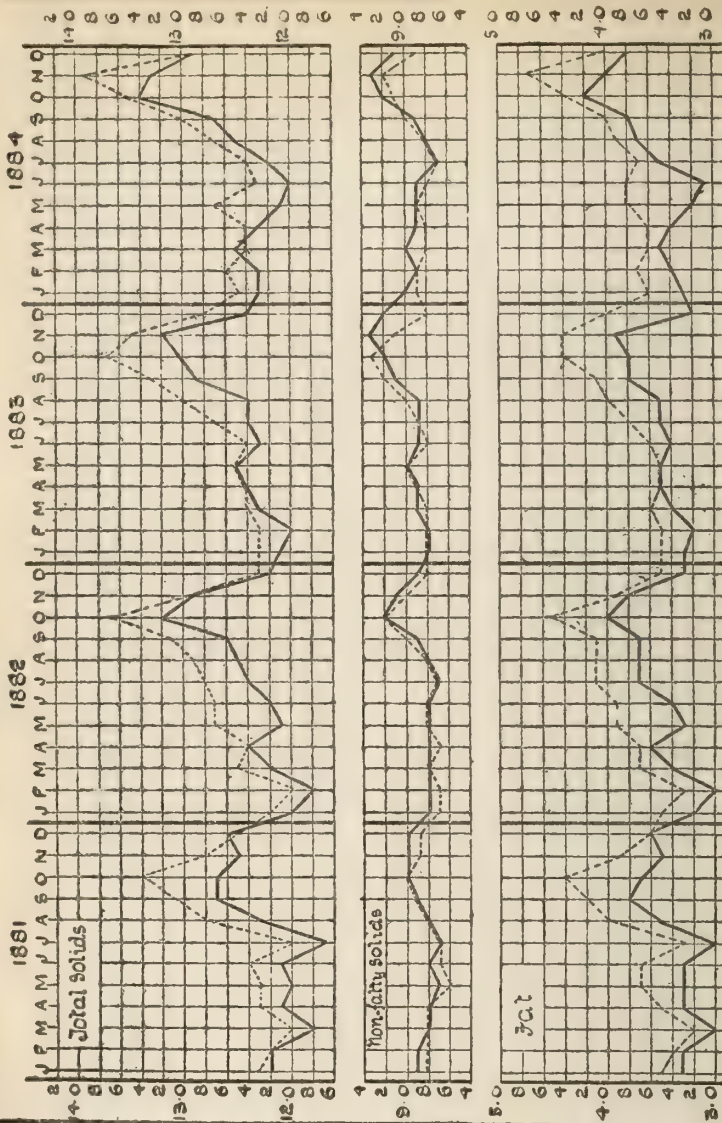
Short-horns

number of Analyses

2407

A. M. meal

O. M. meal



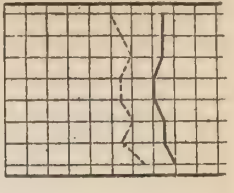
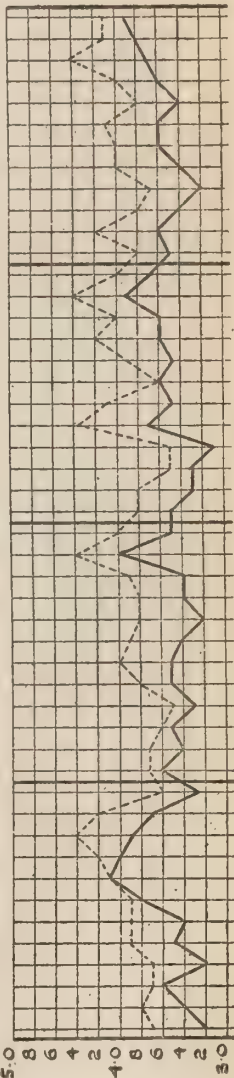
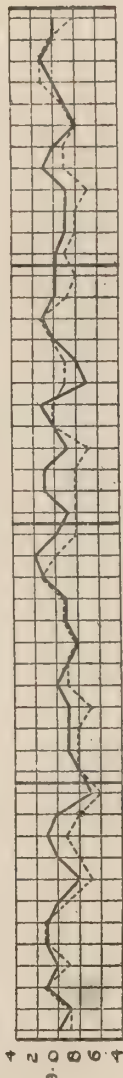
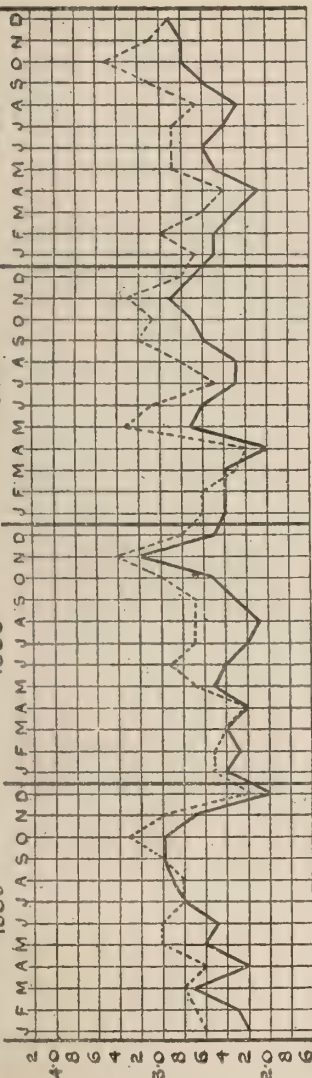
Form A continued.

1885

1886

1887

1888



Farm B.

situated in Wiltshire

60

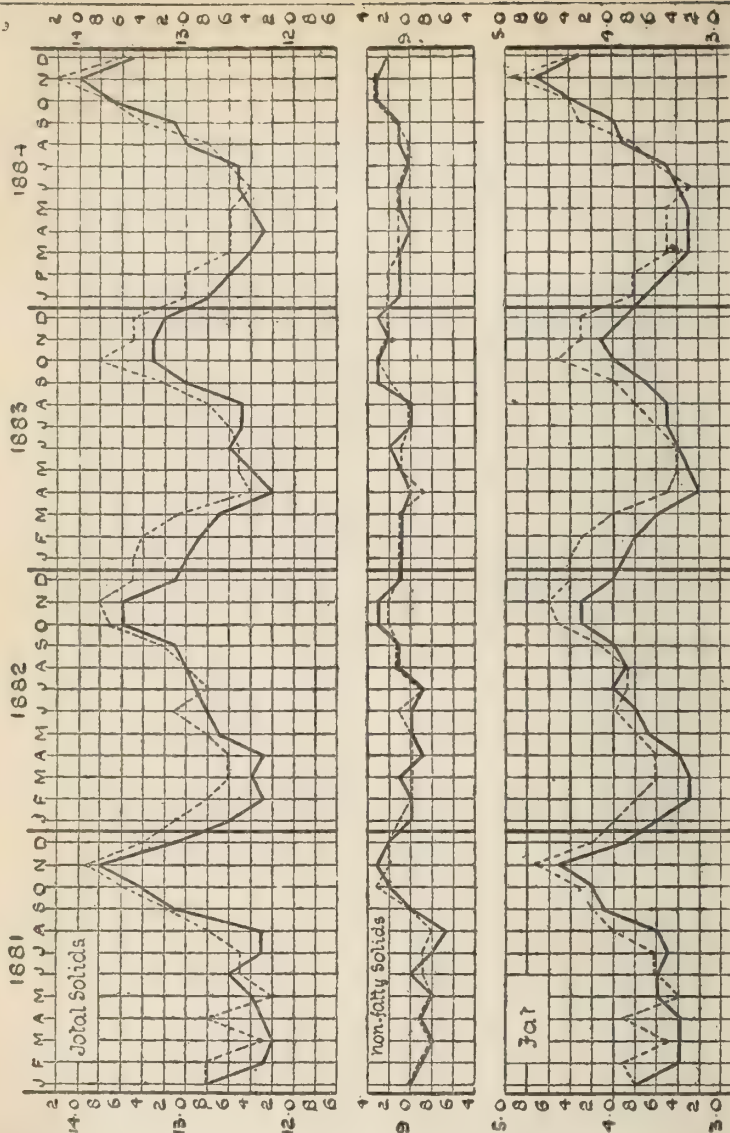
Shorthorns

Number of Analyses

2246

— **Am meal.**

---- **Om. meal.**

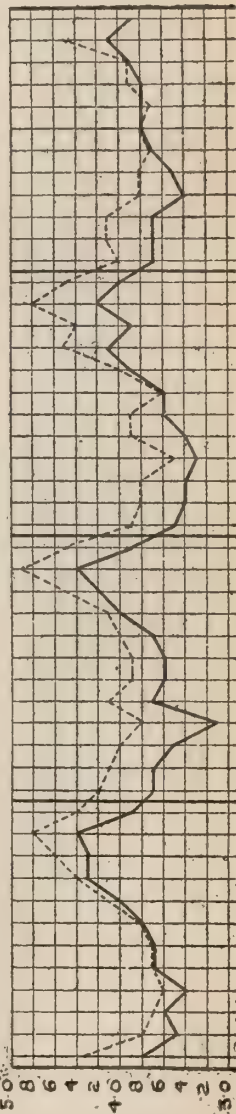
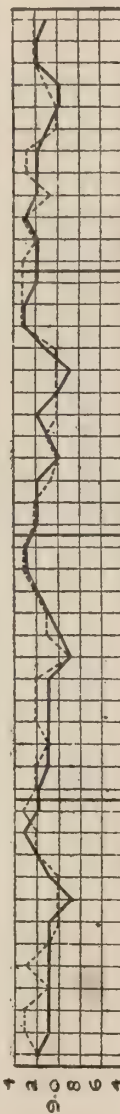
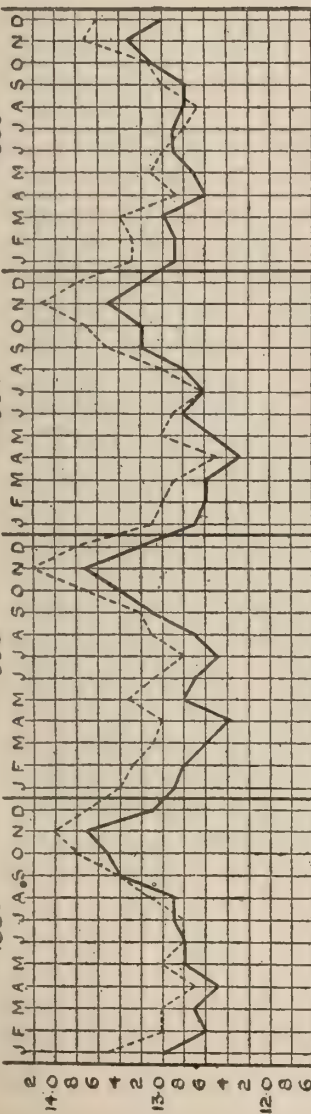


farm B continued. 1885

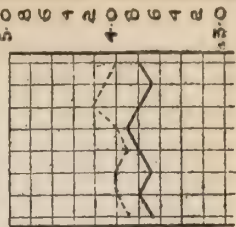
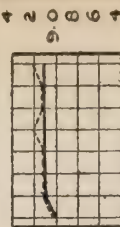
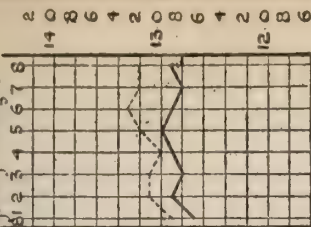
1886

1887

1888



Yearly Averages



Farm C.

situated in Berkshire

35

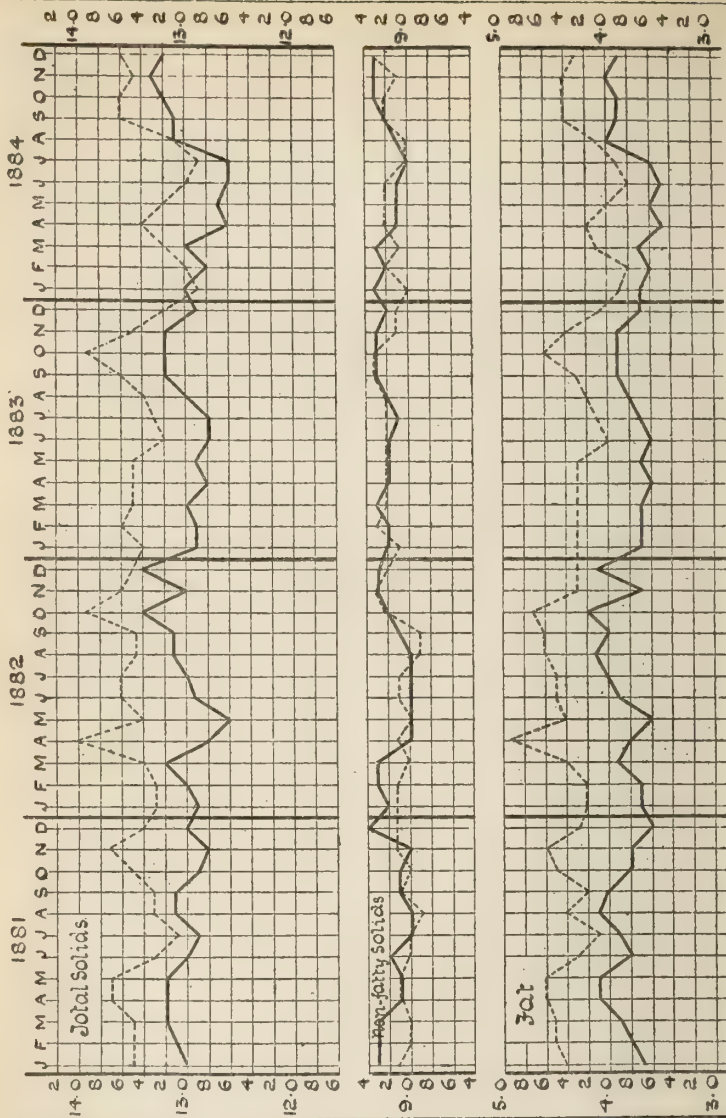
Short-horns.

Number of Analyses

2243

— A.M. meal.

--- G.M. meal.

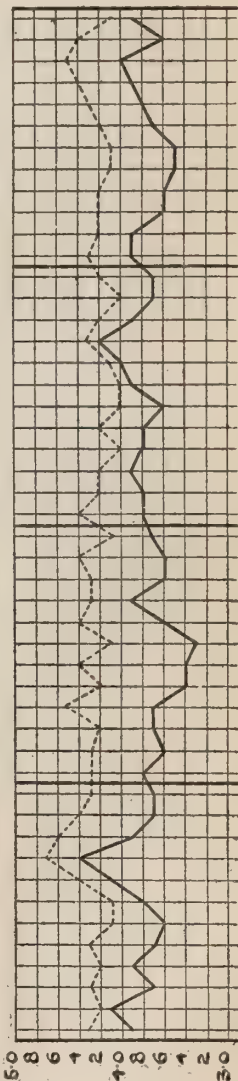
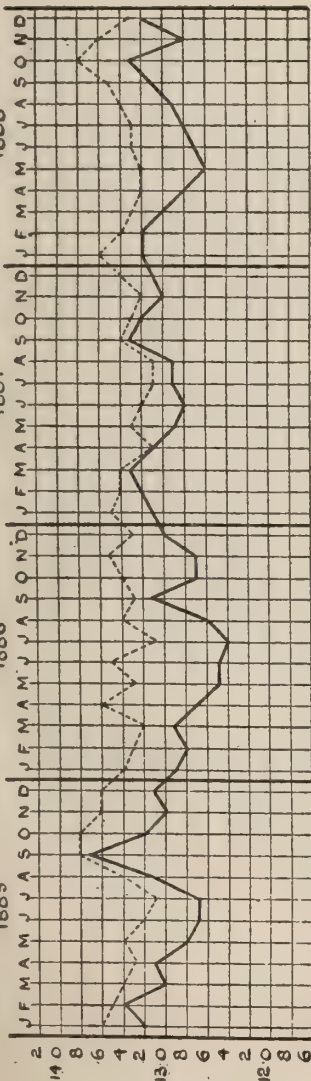
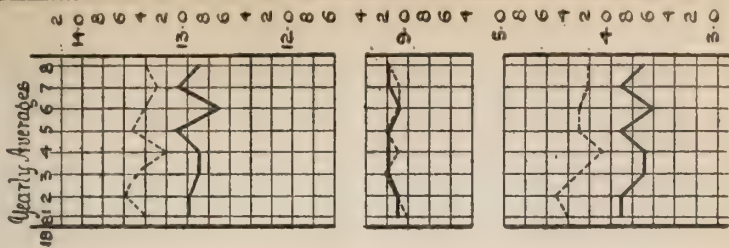


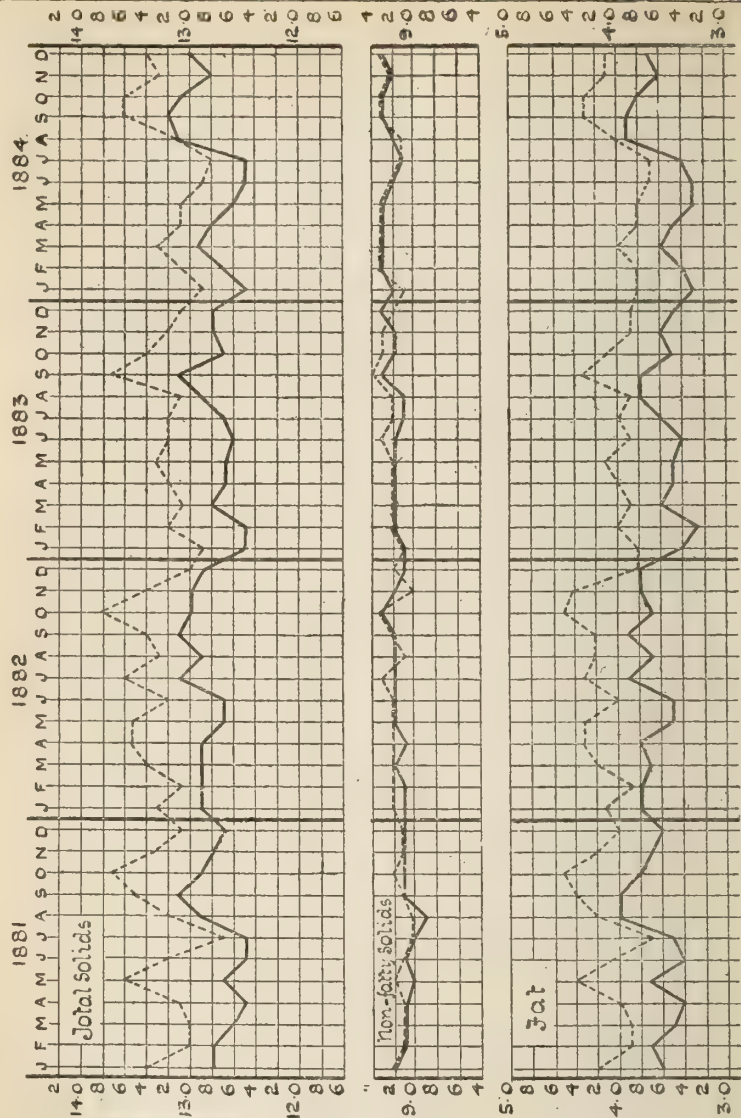
Form C continued.
1885

1886

1887

1888





Farm D

situated in Wiltshire.

140

Short horns.

Number of Analyses.

4815

— Am. meal.

---- O'm. meal.

Farm D continued.

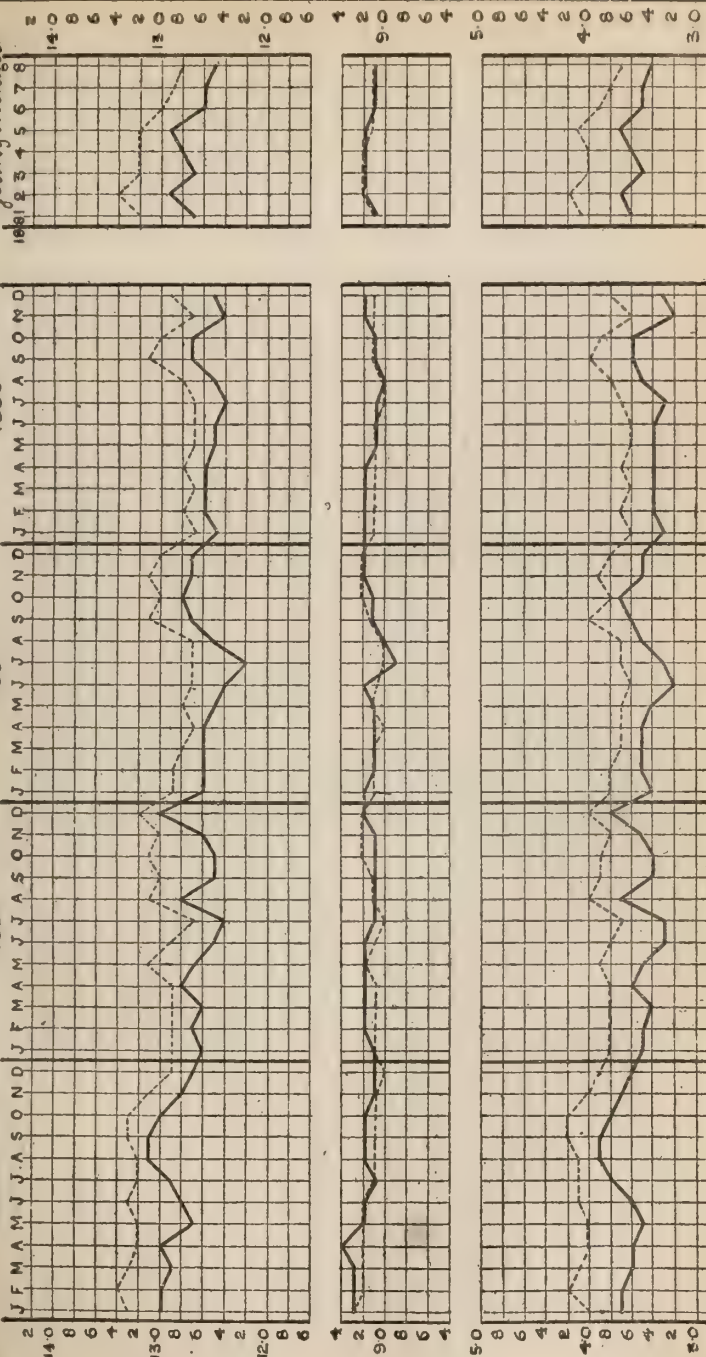
1885

1886

1887

1888

Yearly Averages



Farm E

Situated in Wiltshire.

33 Shorthorns.

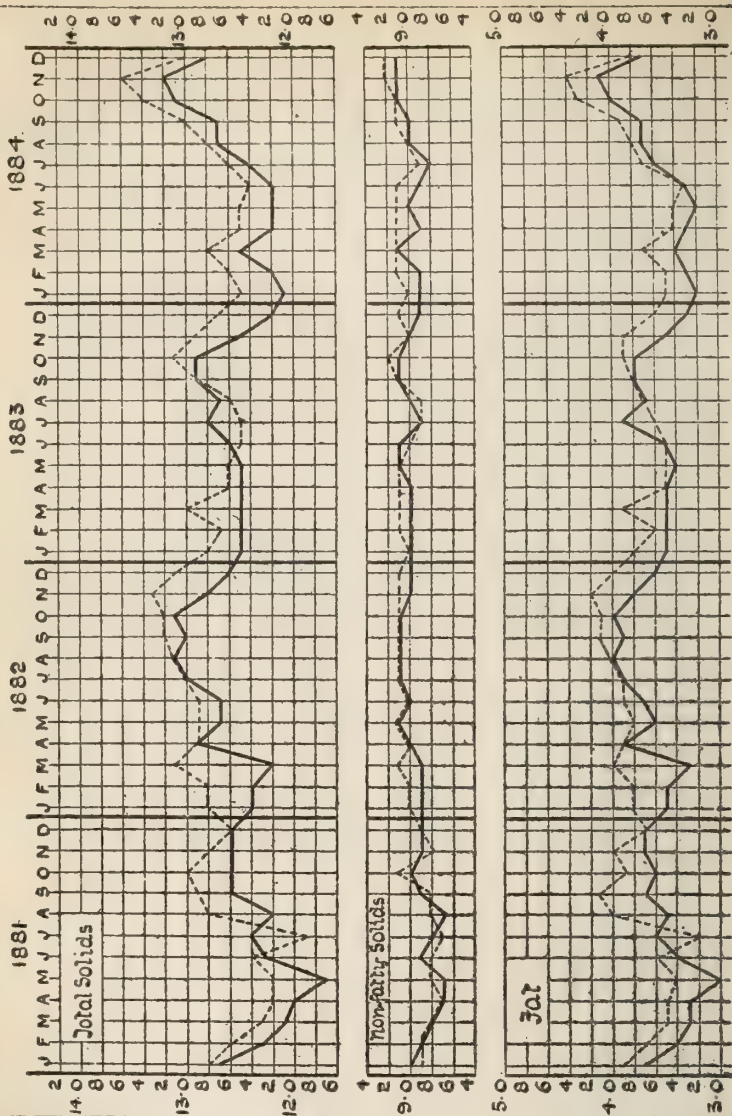
2 Alderneys.

Number of Analyses.

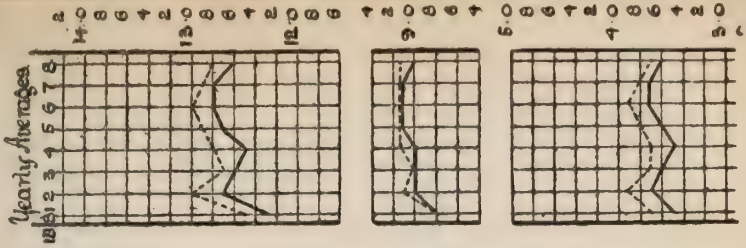
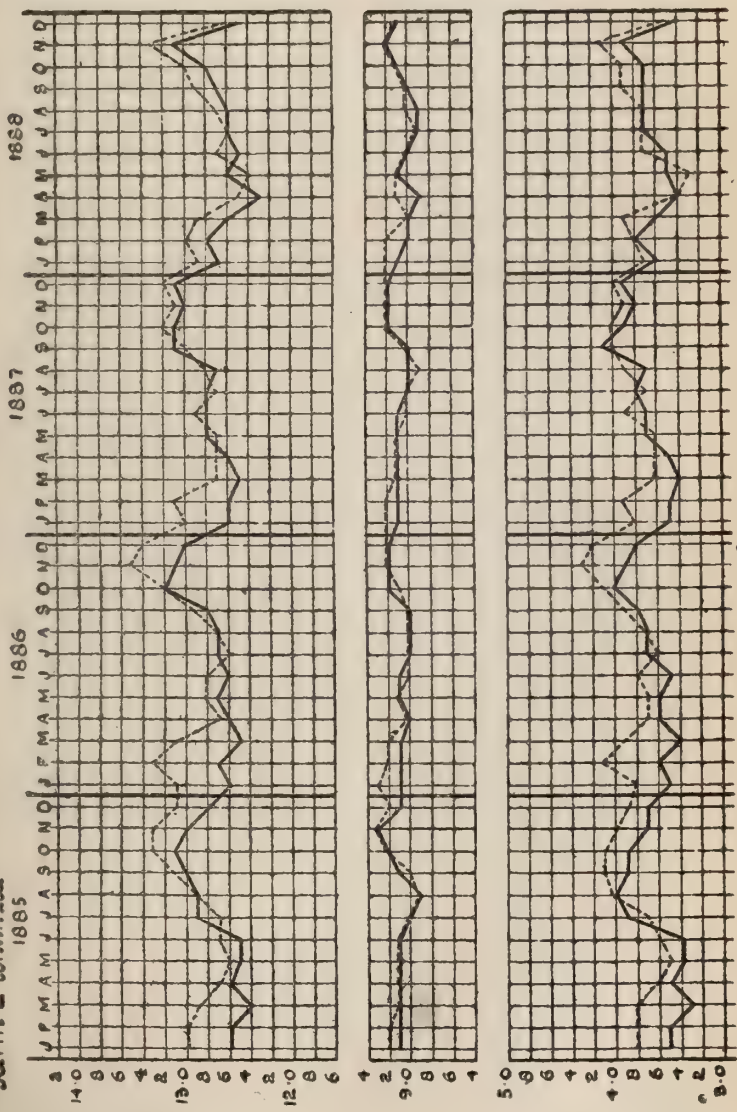
2213

— A.m. meal.

---- G.m. meal.



3. Arm E continued



Farm F

situated in Berkshire.

57

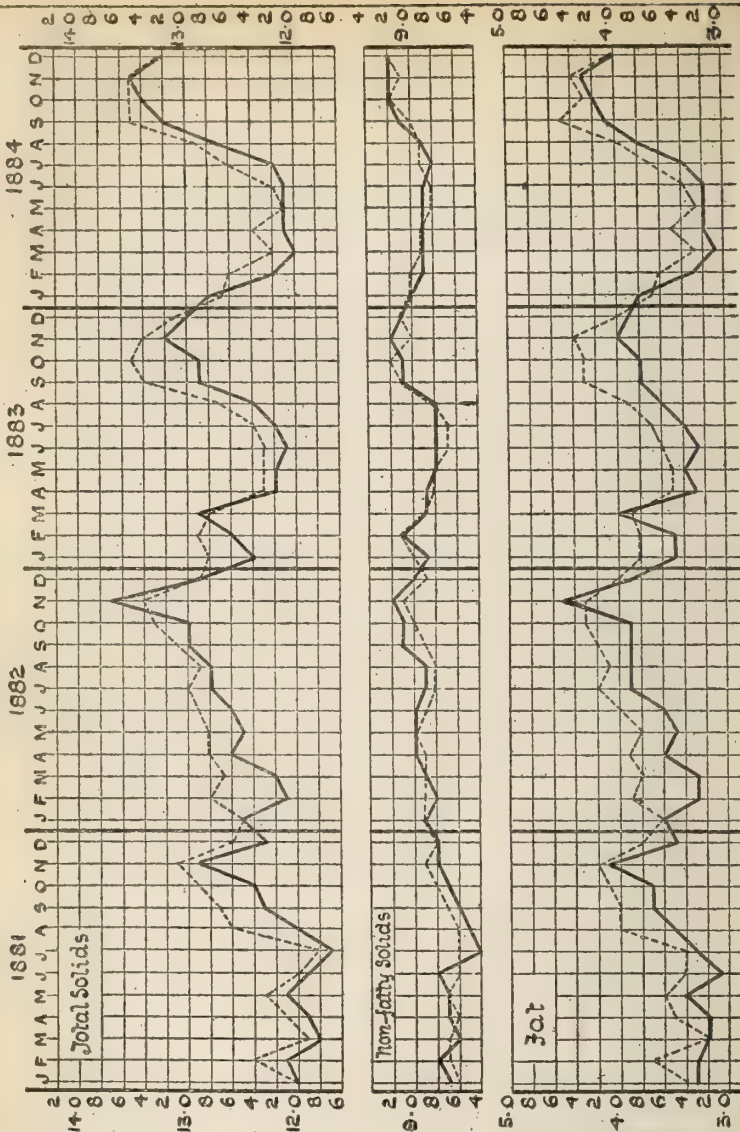
Shorthorns.

Number of Analyses.

2063.

— A.m. meal.

--- P.m. meal.



Form F continued. (1)

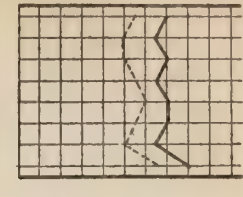
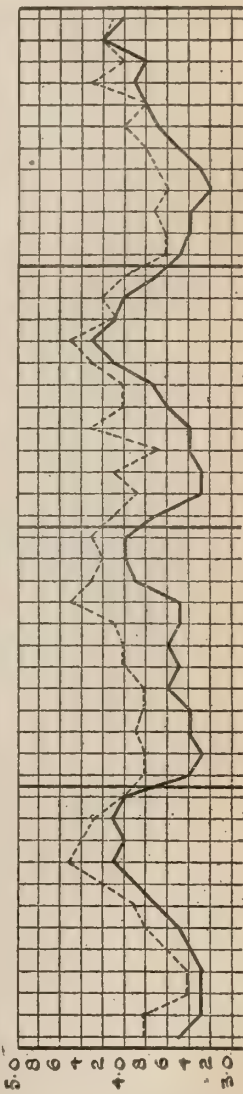
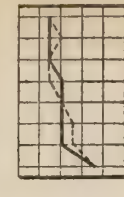
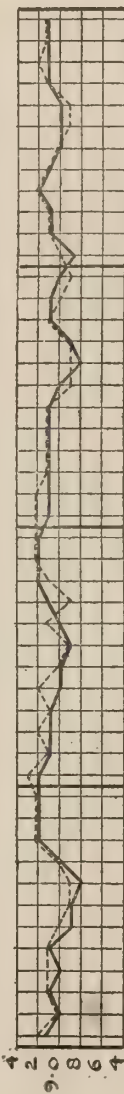
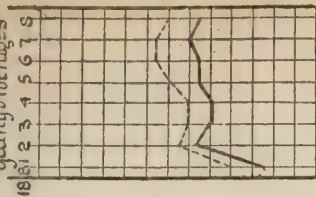
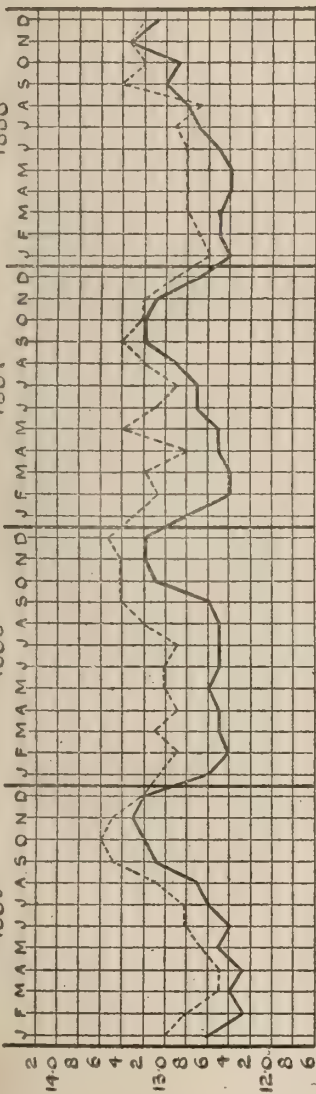
1885

1886

1887

1888

Yearly Averages



Farm C

situated in Berkshire.

50

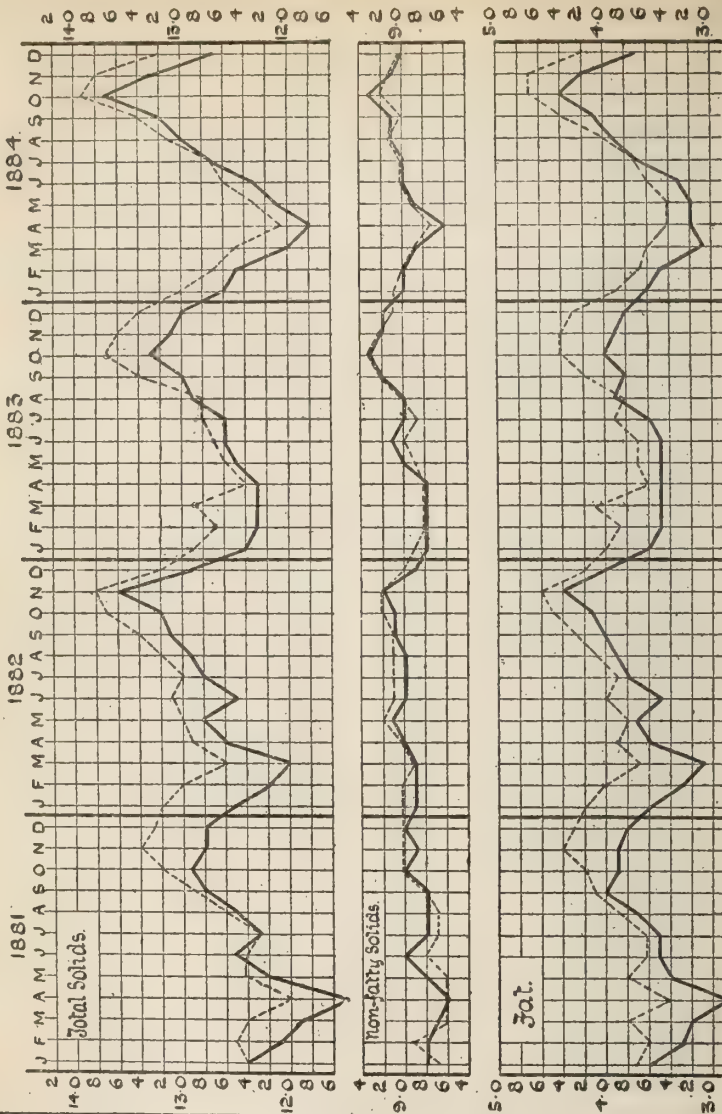
Shorthorns.

number of Analyses.

2617.

— Am. meal.

--- O'm. meal.



Form C continued.
1885

1886

1887

1888



Herd kept on The Aylesbury Dairy Company's estate near Horsham.

Shorthorns

Jerseys

Kerrys

number of cows engaged in experiment.

84

17

35

number of Analyses

1006

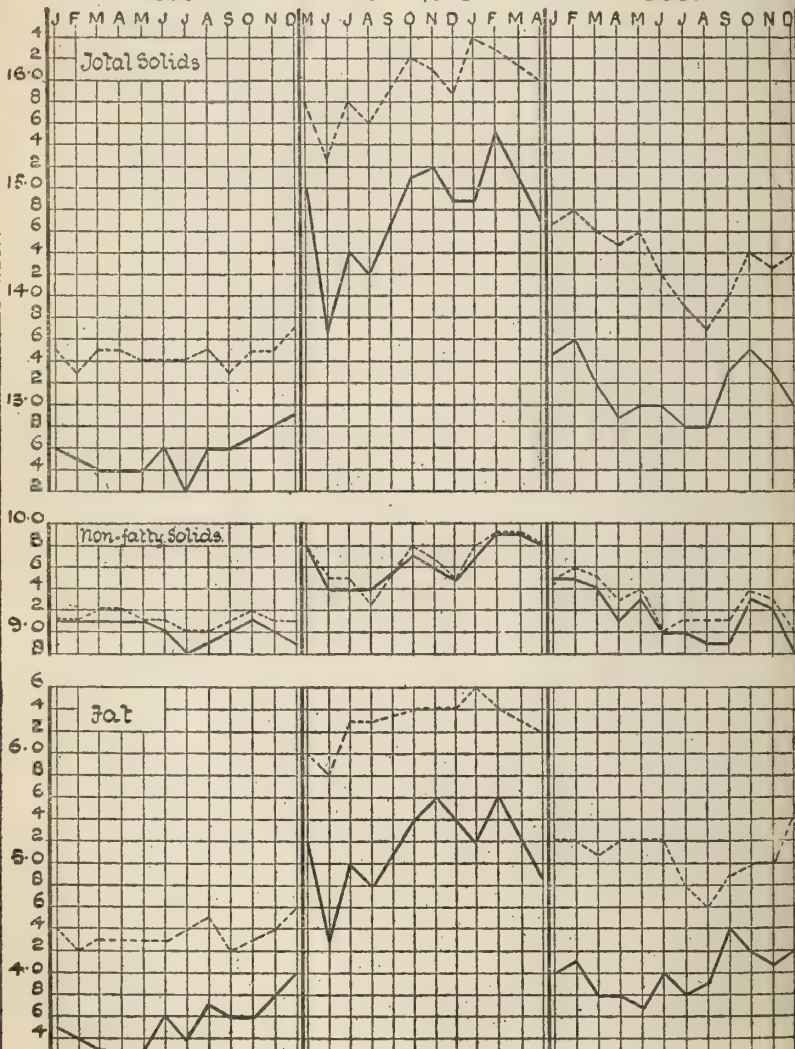
236

410

1886

1887 - 1888

1888



Yearly Averages.

A.m.	12.5	9.0	3.5	14.7	9.6	5.1	13.2	9.2	4.0
P.m.	13.5	9.1	4.4	15.9	9.6	6.3	14.4	9.3	5.1

IX.—*The Growth and Development of the Trade in Frozen Mutton.* By Major P. G. CRAIGIE.

MATCHLESS as the flocks of the British farmer have been proved in many a show-yard, it is with no little anxiety that the student of our annual returns perceives that the numbers of our sheep are again diminishing. There may never have been a time when these islands boasted a flock of 50,000,000 head, although such was the impression of our fleecy wealth formed by more than one Continental writer early in the century. But it needs no reference to ancient history, and no reliance on the guesses of an unstatistical age, to discover the serious diminution of our sheep stock. We know with some certainty that twenty years ago our flocks numbered 35,600,000, and that fourteen years ago they were still 34,800,000 strong; whereas in June 1888 there were counted only 28,900,000 sheep in the whole United Kingdom.

Only thrice before, and then at a date when the decline was accounted for by the memorable losses due to liver-fluke, have we recorded so small a flock. Nor is the absolute loss the only serious feature of the matter: its relative significance is greater still. If we have nearly 7,000,000 fewer sheep in 1888 than we had in 1868, we have 7,000,000 more consumers.

It is inevitable, therefore, that some explanation should be demanded of this phenomenon—common though I believe it to be among the older nations of our time. Several things may have happened. We may conceivably have become as a nation so much poorer that we consume less meat than we did. We may perhaps have changed our tastes, and, while using as much meat in the aggregate, have become smaller mutton-eaters than before. But, on the contrary, it may also well be asked, Does not the skill of our breeders furnish as much mutton as ever from a flock numerically reduced, but of much earlier maturity than of yore? Something is to be said for all of these explanations, and most of all for the last. It is, however, with another possibility that I propose to deal in this paper. It has been asked, even if we are eating rather less, and producing rather more from a smaller stock, must not the conclusion be that, with mutton as with wheat, the Englishman is turning to the foreigner or the colonist for the provision of that which our yearly extending pastures might have been expected to supply?

Only eighteen months ago I pointed out in this Journal¹ that the British flockmaster had indeed little to fear from the

¹ Vol. XXIII. (Second Series), pages 465 *et seq.*

competition of our neighbours on the Continent, whence we draw almost all our imports of live sheep; but that there was one quarter in which a competitive development might conceivably be looked for—namely, the frozen mutton trade.

When we saw on the one side the rapid shrinkage of all the European flocks, and measured on the other the distance of ocean transport which separates England and her mutton-eating population from the Antipodean regions where the relation of flocks to people is reversed, the prospect of a large live importation from such countries was seen not to be serious. But it was enough to recognise the fact that the mouths were here, and the sheep yonder, to feel sure that science was nearly certain to bridge the ocean barrier; and, prices permitting, only time was needed to develop the new business which had already begun to pour into our docks a heavier stream of frozen carcasses than ever reached our ports alive.

The possibility of a collapse of the frozen trade, from the low values of imported mutton in our markets in 1886–87, made it wise to await the progress of events before any rash attempt to gauge the staying capacity of the new competitors. But now, with the record of a nine years' completed experiment, for the last seven of which official data exist to measure the growth of the imports, I question if it would be permissible to look on the import trade in frozen mutton as other than an established one. Whatever may be its future ultimate expansion, it has passed through a crucial test. It cannot, therefore, be uninteresting to note its rise, and to measure its dimensions at the present time.

The Table on page 205 shows our annual population, and our sheep stocks here, to which I add the yearly number slaughtered, according to the estimate of Sir Henry Thompson made in 1872 in this Journal,¹ as slightly amended in the figures I ventured to offer in 1887. Alongside of these I place the live imports and the carcasses of sheep which the fresh-mutton arrivals from the three sources of the frozen trade—that is, from Australia, from New Zealand, and from the Argentine Republic—represent. Practically, it will be seen, the new trade now means the addition of 2,000,000 head of sheep to our annual supplies, while two frozen sheep are now landed in England for every one that comes alive.

In the Table here given I have simply followed the old estimate, that no more than two out of every five native sheep and lambs counted in June become mutton in each twelvemonth.

¹ Vol. VIII. (Second Series), pages 152 *et seq.*

POPULATION, NATIVE SHEEP, AND IMPORTED SHEEP.

Year	Population at the middle of each year	Number of sheep and lambs enumerated annually in June	Number assumed to be slaughtered annually, <i>i.e.</i> 40 per cent. of those enumerated	Number of sheep imported alive annually	Number of carcasses of frozen sheep imported
1879	34,155,000	32,238,000	12,895,200	945,000	—
1880	34,469,000	30,240,000	12,096,000	941,000	400
1881	34,930,000	27,896,000	11,158,400	935,000	17,275
1882	35,290,000	27,448,000	10,979,200	1,124,000	66,095
1883	35,612,000	28,348,000	11,339,200	1,116,000	201,791
1884	35,962,000	29,377,000	11,750,800	943,000	632,917
1885	36,325,000	30,086,000	12,027,200	751,000	777,891
1886	36,707,000	28,955,000	11,582,000	1,039,000	1,187,547
1887	37,092,000	29,402,000	11,760,800	971,000	1,542,646
1888	37,454,000	28,939,000	11,575,600	956,000	1,975,208

If our mutton crop is really greater now, as I fancy might be shown, the total consumption is by so much increased beyond the estimated number of carcasses here shown as constituting the yearly food supply. But the whole question of the quota supplied by our native flocks—and, for the matter of that, the yield in beef of our native herds also—might well form hereafter a separate subject of inquiry. It is as important now as the Council thought it in 1886 that we should learn, somewhat more exactly than we have ever yet done, what is the meat production of the United Kingdom. But, as it was seen then, such a question must be treated exhaustively, if at all. I shall not, therefore, attempt to complicate a subject, difficult enough in itself, by showing in any detail how, if five home sheep out of every ten, in place of only four, go annually to the butcher in these days of early maturity, we might reduce the relative proportion of the foreign supply. Its absolute bulk and the lesson of its steady growth—the two points on which I wish to fix immediate attention—remain the same, whatever may be the precise share of the British flockmaster in making provision for the national dinner-table.

Suffice it here to note that, on the basis of the older theory of home production, the whole foreign quota is now between $17\frac{1}{2}$ and 18 per cent. of the mutton consumed in England. On the second hypothesis, the whole consumption being greater, and the domestic out-turn larger, the 4.6 lbs. of foreign mutton per head of our population which we receive alive or dead would represent little more than $14\frac{1}{2}$ per cent. Of these 4.6 lbs., the frozen trade now provides nearly 3 lbs. for each man, woman, and child in the United Kingdom, while the mutton represented by the live sheep importation does not much exceed $1\frac{1}{2}$ lb.

Largely, therefore, as the new imports have increased, they are not yet enough to supply each unit of our population with a single ounce of mutton per week; while the produce of our own pastures, at the lowest of the two estimates, is still sufficient to provide each one of us with nearly an ounce per day.

It is not uninteresting to refer here to the different course of the trade in fresh foreign beef and frozen foreign mutton. Twelve years ago this Journal¹ reported the remarkable beginning made by the fresh beef trade from the United States. In a single twelvemonth the export from the ports of New York and Philadelphia alone, reckoned at 36,000 lbs. in the month of November 1875, rose to 4,194,000 lbs. in the month of November 1876, and by April of the next year the monthly total exceeded 8,500,000 lbs.

Calculated on our population here, the foreign beef received, which was only $4\frac{1}{4}$ lbs. per head in 1874, became $10\frac{1}{2}$ lbs. by 1880, the live cattle exports from America developing marvellously in the same interval. But after this sudden rise the trade was checked. Since 1880 we have had no more of such increases as this in the beef import trade. Except in the years 1883-84, when a rally was made, the average beef imports fell away from the high level then reached, and, measured on the population, cannot, since that date, be said to have constituted a growing competition in our markets with the produce of our own herds.

Now the course of business as regards mutton imports has been entirely different. It is true that mutton was considerably later than beef in finding its way in any notable quantities to our shores. Both in 1869 and in 1874 the foreigner sent us no more than $1\frac{1}{2}$ lb. apiece. Even six years later, when American cattle and refrigerated beef were largely coming to hand, the mutton imports, so far as recorded at any rate, were still wholly made up of live sheep, and did not reach $1\frac{3}{4}$ lb. per person. With 1880 the new trade, as I have already shown, began. Two years later the Board of Trade Returns recognised it, and enabled us to trace its dimensions and its growth. Unlike the business in beef, the new trade has known as yet no check in its progress, if there has been some variety in the sources of supply. Nine years ago it was computed that the foreign importation was less than 7 per cent. of the mutton eaten here: it now forms $17\frac{1}{2}$ per cent., or $14\frac{1}{2}$ per cent., of the annual consumption, according as we adopt the higher or the lower estimate of our native yearly production.

¹ See Professor Sheldon's article on American Meat Trade, Table III, Vol. XIII. (New Series), page 332.

The growth of the fresh or frozen trade will be best traced, however, by putting out of sight the live imports altogether, and regarding only the meat which reaches our shores dead in a fresh or preserved condition. We can only go back here for a short period, but the complete head-rate figures for the last six years, for fresh mutton and fresh beef, will indicate with precision the emphatic difference between a growing and a stationary trade.

Year	Fresh mutton imports per head lbs.			Fresh beef imports per head lbs.		
1883	.	.	.75	.	.	2.51
1884	.	.	1.26	.	.	2.73
1885	.	.	1.76	.	.	2.78
1886	.	.	1.96	.	.	2.46
1887	.	.	2.35	.	.	1.99
1888	.	.	2.96	.	.	2.50

Foreign mutton, it appears, supplies to-day nearly half a pound more for each unit of our population than is provided by the much longer established fresh beef trade. The problem, therefore, which any one who is calculating the chances of the further growth of the newer trade must try to face is, whether the course of events already seen in the check of fresh beef imports is to be paralleled or not in the case of mutton. And for such an object it is obviously necessary to extend our view and examine in some detail the several sources of supply, the cost, and the conditions of transit—all these factors bearing materially on the question whether we have before us the prospect of a temporary, a permanent, or an augmenting competition.

Comparatively little of the 49,450 tons of fresh mutton which reached our shores in 1888 came from the countries which were recognised as exporters when this item first appeared in our annual records. The trade is not only, therefore, a new one, but it has varied in its character in the brief period of its existence. In 1882, an aggregate weight of 9,400 tons only was reported, and two-thirds of the imports then accounted for came directly from Holland. This trade is not a frozen one at all. In 1888, the Dutchmen furnished much less than a tenth part of our whole imports—only 8.8 per cent., in fact. New Zealand first sent over frozen sheep in 1882, and in that year could not be called the source of more than 3 per cent. of the imports. To-day her quota, measured by the weight of her sheep, is over 50 per cent., or more than half of the whole supply. Again, the Argentine Republic, wholly unnoticed as an exporter of mutton six years ago, furnishes to-day more than a third of the whole, or nearly 36 per cent. of the arrivals.

Six pounds out of every seven of foreign fresh mutton eaten in England now come from these two last-named countries alone—countries which a writer on the prospects of the trade only six years ago would have hardly taken into account at all. Sudden changes such as these urge caution in any conclusions based even on the figures that are now recorded. The following Table will, however, show at least the leading countries whence fresh mutton has actually reached us throughout these seven years, and it will enable us to mark the striking changes in the source of our supplies. I give the quantities here in cwts. for closer comparison, and to lighten the figure reading I omit “000” in each case, quoting for thousands only:—

COUNTRIES OF ORIGIN OF FRESH MUTTON.

("000" omitted.)

Year	Holland	United States	Australia	New Zealand	Argentine	Other countries	Total
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
1882	123	29	31	6	—	—	189
1883	83	41	31	72	4	5	236
1884	116	32	61	241	40	13	503
1885	81	33	54	284	112	9	573
1886	52	6	38	347	190	20	653
1887	64	2	43	396	251	27	783
1888	88	1	44	499	353	4	989

This table will show the annual dimensions of the true factors in this growing trade, and their relative importance is thus made evident.

When once we have the facts presented to the eye as in the above table, we see that the general term Australian mutton, applied colloquially to the frozen flocks which have multiplied so rapidly of late years in our markets, is, in its strict sense, an entire and absolute misnomer. The purely Australian section, which comes from the two colonies of Victoria and New South Wales, has varied little—or rather, after moderately expanding, it again contracted. The United States' supply has been of no particular moment at any time, and is of no account at all at present. The Dutch supply is one of fresh, not frozen carcasses, and is fluctuating in amount. Consequently it is to the colony of New Zealand and to the Argentine Republic alone that the practical development of the frozen trade must be ascribed.

There have been, it is true, some spasmodic but unsustained importations from special countries, unnamed above, which have altered the yearly volume of supplies in the “other countries” column. Some of these, perhaps, deserve a passing notice before

restricting attention to the more important sources. Thus, in 1883, but apparently never again, Peru appeared as an exporter. More than half the "other countries' " supply of that season was credited to a Peruvian import of 2,559 cwts. of fresh mutton. Again, in 1884, a like rôle was played by Uruguay, whence 8,467 cwts. arrived.

In 1886, what at one time seemed to be a formidable beginning was made by the Falkland Islands, whence came a single cargo of some 30,000 carcasses, weighing nearly 18,000 cwts. This was followed in 1887 by more than one shipment, bringing a total supply of 41,000 carcasses, weighing 23,476 cwts., from the same remote quarter. The earliest of the 1887 cargoes fetched only 3*d.* to 4½*d.* per lb., and the latter was disposed of, in part at least, at prices varying from 3½*d.* to 4*d.*—values which cannot have been very encouraging to the enterprising islanders, who still, I believe, profess an intention to ship sheep to Great Britain. The import tables of last year do not, however, contain any repetition of their feat, and the two-year effort of the Falklands seems to have succumbed to the low prices of 1887. The failure is variously accounted for—by the want of preparation for the treatment of the sheep at the port of embarkation, by their being overdriven before slaughter and freezing, and, in the latter shipments, by some defect in the arrangements during transport. The mere fact, however, that sudden additions to our frozen supplies such as this may at any moment become feasible is not, of course, to be overlooked. In this instance we had a little colony with a population of some 1,800 persons raising their sheep stock from 10,000 to 500,000 in twenty-five years' time, and actually sending here, in 1886, in one cargo more than three times as much mutton as New South Wales, with her older frozen trade and her 40,000,000 sheep, supplied in that year, and again in 1887 exceeding in her contribution to our imports the totals of either New South Wales or Victoria.

The European supply, other than the Dutch, is now very small and irregular. But it is doubtless capable of considerable development. I am disposed to believe that the Dutch supply itself may have, in the past, come in partly from German territory. Certainly some small carcasses unlike the native *Hollanders* have always been among the receipts from the Netherlands.

In connection with this continental trade a surprising change in the receipts of fresh mutton presents itself as this paper goes to press, and reminds us of the ever feasible extension of old, or sudden development of new sources of supply. The increase in the current year is, indeed, not an additional import, but simply

an exchange of a live for a dead supply ; and British agriculturists, awake as they always are to the risks of contagion inseparable from the live sheep trade, must necessarily view the transfer with peculiar satisfaction.

The events which have led to the closing of the German ports by the Privy Council Order of March 1 are too well-known to the readers of this Journal to require repetition here. But it is legitimate perhaps to note that the effect of stopping the German live sheep trade has been largely to swell the shipments of fresh, though not frozen, mutton from North Sea ports. Especially, I am informed, is Antwerp now slaughtering for the English market. The German sheep usually directed on Hamburg or Bremen, being denied the passage which until May last was given them through Holland, now pass through Belgian territory to be converted into mutton at Antwerp, and are thence entering our markets, favoured by the coldness of our spring, as a competitive supply of continental mutton.

The extent of the movement as a disturbing factor in the trade, and one at variance with the usual course of imports at this season of the year, will perhaps be best shown by simply quoting two items from the weekly statements issued by the Customs House of the present arrivals of sheep and of fresh mutton respectively, and comparing them with the figures of the corresponding week of 1888 :—

Imported during week ending	1888		1889	
	Live sheep	Fresh mutton	Live sheep	Fresh mutton
	Number	cwts	Number	cwts
March 30 .	16,013	1,955	2,439	25,247
April 6 . .	21,125	1,264	1,217	29,270
April 13 . .	20,754	4,042	1,066	28,806

These three weeks' imports furnish sufficient indication of a sudden and casual increase of the fresh mutton trade. The ease with which the change in the case of our continental neighbours can be made is a good argument for substituting a safe for an unsafe trade.

The figures with which I have dealt in the Table on page 208 have exhibited the chief sources of our mutton supplies in actual weight ; but, as will have been observed, the record in this form includes more than the frozen sheep. It includes certain distinct Continental arrivals, hitherto chiefly from or through Holland, and it embraces the importations which for a few years came from the United States. Since the Board of Trade Returns go back only to 1882, I turn to the trade circulars of the

importers to enable me to contrast from the very outset of the enterprise, nine years back, the actually frozen carcasses of sheep, from Australia proper, New Zealand, and the River Plate, in the following form :—

Year	Australia	New Zealand	Argentine
	Number of carcasses	Number of carcasses	Number of carcasses
1880	400	—	—
1881	17,275	—	—
1882	57,256	8,839	—
1883	63,733	120,893	17,165
1884	111,745	412,349	108,823
1885	95,051	492,269	190,571
1886	66,960	655,888	434,699
1887	88,811	766,417	641,866
1888	112,214	939,915	924,003

What these figures teach us, then, would seem to be that if we want a comparatively easy way to measure the addition to our market for mutton, which the frozen trade of these three countries relatively supplies, we might say that Australia, with her 80,000,000 flocks, just delivers in England about as much mutton as a single English county of the sheep-carrying capacity of Oxford, Warwick, or Cambridge annually sends to the butchers. New Zealand, on the other hand, out of flocks one fifth as great as Australia, and almost the same as England without Wales now possesses, sends a supply equal to that we may imagine the combined flocks of Yorkshire, Durham, and Cumberland would yearly yield. In like fashion, the frozen quota from the River Plate—a mere sample, as it were, from flocks vaguely estimated at 90,000,000 head—may be said to furnish a duplicate supply to the aggregate yearly produce of four such English counties as Somerset, Dorset, Devon, and Cornwall.

Very different, however, would this comparative statement prove if we commuted the frozen and the native sheep into their relative weights in dressed meat. Neither the large contingent of Argentine sheep nor the smaller quota of Sydney carcasses would probably reach, if we place the aggregate weight in the Board of Trade Returns in contrast with the number of sheep accounted for by the trade circulars of the companies, more than 45 lbs. apiece, against the 70 lbs. which I assumed as the mean of all ages in estimating the out-turn from our domestic flocks ; and the New Zealand importations, which originally were landed here at something like the last-named weight, are now, with much variety of weight in particular consignments, hardly averaging more than 56 lbs. each.

No one, however, who wishes to form an accurate idea of the new trade will confine his attention to the exact numbers or exact weight of meat for the moment represented. The ratio of growth is a factor which will command even more serious attention. And here such a Table as I have given will indicate that, whatever the future may have in store in the way of surprises, there are but two steadily developing sources of supply, New Zealand and the River Plate.

The Argentine consignments, it will be seen, which compose the shipments from the last-named quarter, are those which display the most notable yearly growth. In this case the arrivals of 1888 exceed those of 1887 by over 40 per cent.; those of 1887 in their turn were higher than the imports of 1886 by nearly 48 per cent., while in the single twelvemonth before that there was no less than 128 per cent. increase. The rate of growth diminishes as the gross quantities increase, but the strides made in face of the low prices, which these shipments have nearly uniformly met here, are suggestive of very considerable future possibilities.

The New Zealand import of mutton in 1888 was 23 per cent. over that of 1887; the year before the increase was some 17 per cent.; and the year before that double this rate: so that New Zealand is supplying us at lower prices, and notwithstanding Argentine competition, with more than twice as many carcasses as came from that colony only four years ago.

The Australian supply, though larger this year than last, has shown no such expansion as this—and, indeed, we get but few more carcasses to-day than were coming in 1884.

Two Australian colonies indeed, and two only—New South Wales and Victoria—send us any mutton imports. The hotter and more northerly Queensland practically contents herself with a modest form of beef export. Notable variations, however, have occurred in the receipts from the two ports of Sydney and Melbourne, respectively, which are not without their lesson on the possible future of the trade, and merit close consideration. Unlike in area, dissimilar in sheep stocks and in the quality and description of their flocks, it was early recognised, in catering for the English market, that the small and lean animals of the merino type sent us from Sydney were less suitable than the heavier cross-bred which could be shipped from Melbourne, although that in its turn was materially inferior in weight and quality to the big frozen sheep which, originally at least, used to reach us from the greener pastures of New Zealand.

Had I been writing at the close of 1887, instead of at the end of 1888, I should probably have insisted, in comparing the New

South Wales and Victorian exports, on the far larger contributions of the last-named colony, and her steadier, if not actually growing, supplies. But with the records of the past twelve months has come another of those sudden and surprising changes which the frozen trade exhibits. Victoria has, for the moment, passed altogether out of sight as an exporter. No Melbourne cargoes have come here at all; and Sydney, whence the trade seemed dwindling to nothing in 1885 and 1886, has on the contrary sent out just as much mutton as both ports furnished a year ago: this, again, being nearly twice as much as she ever exported before since the records of the frozen trade began to tell their story.

I must confess I am unable to give an entirely adequate reason for the very latest change, which may perhaps be caused by local climatic conditions. A simple contrast, however, between the relative sheep stocks and the mutton exports of these two colonies will show how dangerous it is to conclude that the biggest trade will necessarily develop from the largest nominal flock, apart from the local conditions on which, rather than on the stocks behind it, a trade like this depends. The data for the seven years in which our mutton receipts are fully shown are these:—

Year	Victoria		New South Wales	
	Sheep	Mutton imported therefrom	Sheep	Mutton imported therefrom
		cwts.		cwts.
1882	10,174,000	23,133	36,115,000	8,336
1883	10,739,000	10,371	37,916,000	21,376
1884	10,637,000	35,094	31,660,000	26,364
1885	10,682,000	44,489	37,821,000	9,085
1886	10,700,000	32,947	39,169,000	4,762
1887	10,624,000	21,518	46,965,000	20,927
1888	10,600,000	Nil	46,170,000	44,435

Such figures show that, with a stock of sheep one fourth as large as New South Wales, Victoria had, up to the year 1886, sent us nearly seven times as much mutton. Even now, giving Sydney the benefit of the whole 44,000 cwts. exported in 1888, her total output of frozen mutton is far below what Victoria has sent.

There is another consideration of which this analysis of the purely Australian trade reminds me. The Australian portion of our obscurely defined and so-called "unenumerated" meat imports, which had assumed important dimensions before freezing began, was largely mutton in tins. There may be, therefore, some room to suspect that we should err if we regarded that portion of the frozen trade which comes from these colonies as a wholly new development, and not rather, at least to some extent, a mere change in the form of import. If New South Wales and Vic-

toria were content, some years ago, to send us what mutton they could profitably sell us in the form which entails its entry among our canned provisions, that supply, though it would not, under the existing form of our Board of Trade classification, be called mutton, came in all the same as unenumerated meat. And if they now prefer to let us have the mutton, not in tins, but under its own name, and have diminished their canned export accordingly, it is not altogether a new competition with which we are face to face. To put it another way, if our taste here has been transferred, as I am disposed to think it has, from those tins of boiled mutton—"Australian mutton," of which, for a time, the British public heard a good deal, while its virtues were energetically sung—and if we now prefer to have the carcasses of the surplus sheep of our colonies sent us hard frozen, instead of boned and cooked and sealed up, this is a transfer of the competition, not a new supply.

To test the soundness of this view, I would contrast the total meat export and the frozen mutton section over a considerable series of years; but as it is desirable to see whether the above suggestion may be applicable to more than one exporting country, I give the data for all the main sources of the frozen trade, the figures being in every case, it must be understood, in thousands of cwts.—"000" being omitted in each entry:—

Year	New South Wales		Victoria		New Zealand		Argentine	
	Total dead meat imported	Of which received as mutton	Total dead meat imported	Of which received as mutton	Total dead meat imported	Of which received as mutton	Total dead meat imported	Of which received as mutton
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
1870	13	—	54	—	2	—	—	—
1871	50	—	139	—	36	—	—	—
1872	58	—	159	—	83	—	—	—
1873	45	—	80	—	78	—	—	—
1874	54	—	81	—	56	—	—	—
1875	30	—	66	—	9	—	—	—
1876	49	—	69	—	5	—	4	—
1877	68	—	69	—	22	—	—	—
1878	21	—	35	—	36	—	5	—
1879	36	—	30	—	24	—	4	—
1880	58	—	48	—	22	—	3	—
1881	82	—	55	—	8	—	15	—
1882	89	8	57	23	28	6	16	—
1883	156	20	42	10	108	72	13	4
1884	92	26	61	35	270	241	45	40
1885	146	9	63	45	321	284	125	112
1886	41	5	39	33	374	347	220	190
1887	138	21	28	21	437	396	265	251
1888	136	44	3	Nil	574	499	407	353

Here the meat trade, viewed as a whole, is seen to be divided

very differently in the two Australian colonies and in the other and larger sources of our frozen import trade. All but a fraction of the rapidly growing imports from Argentine and New Zealand are explained and accounted for by the frozen mutton, although it is true that in the latest year of all there is a notable increase in the beef exports from the latter country of from 8,000 to 40,000 cwts.

In New South Wales the preserved meat trade has, on a long survey like this, no doubt distinctly grown as a whole ; but that growth can only in part be accounted for by the mutton supplies subsequent to 1882. Indeed, the irregular course of the trade here is its most remarkable feature. Only about one cwt. in every eight was fresh mutton in 1883. About two cwts. in every seven was claimed as mutton in the following year. Not so much as one cwt. of mutton was counted in any sixteen of the exports of 1885, while one cwt. in every three was frozen mutton last year.

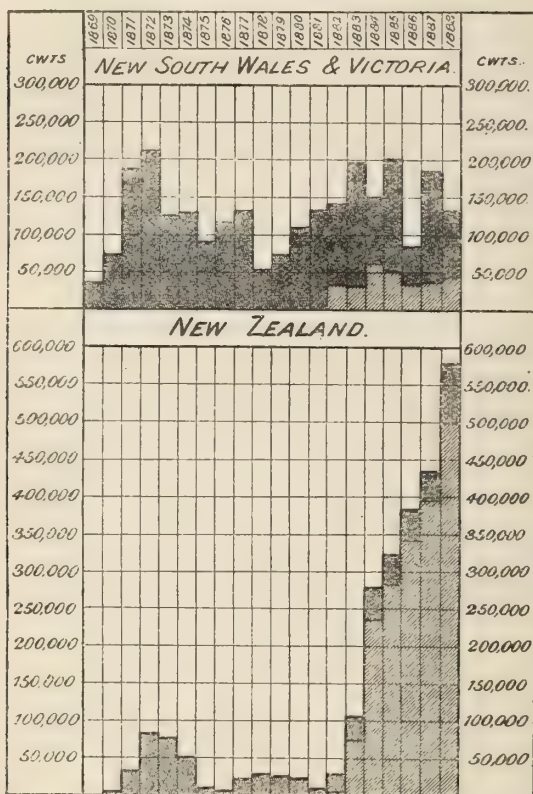
The figures, however, of my Table suggest that, to some extent, the mutton trade from Sydney is in addition to, and not in substitution of, that before existing in the "canned" shape.

The moment the Victorian statistics are closely examined, the position varies. Here it becomes plain that the dead meat exports of sixteen years ago are things of the past. All the frozen carcasses which Melbourne sent us between 1882 and 1887 never raised the entire meat exports to the level they stood at before 1878, and for the last three years the arrivals of any form of dead meat have been, relatively, very small, and, 1888 excepted, practically all were mutton. Only 39,000 cwts. of any sort of meat were imported from this colony in 1886, and 28,000 cwts. in 1887; while 33,000 cwts. of the former, and 21,000 cwts. of the latter supply came as frozen carcasses. In 1888 a bare 3,000 cwts. remained as the representative of a trade that sent us 139,000 cwts. in 1871, and 159,000 cwts. in 1872.

The dimensions of our canned or tinned imports, in at least one of the sources of mutton supply, must thus be taken into account in dealing with the frozen trade. Speaking generally, few persons will probably dissent from the conclusions at which Mr. Clare Sewell Read arrived in his report on the Colonial Meat Products of the Indian and Colonial Exhibition in London in 1886, that, with falling prices of beef and mutton in other forms, a large consumption of common tinned meats can hardly be looked for. The convenience and portability of these provisions for exceptional purposes, for travellers, voyages, and military expeditions, will always ensure their use ; but the extent of this demand must probably be irregular and spasmodic.

The following diagram plainly shows the entirely different character of the frozen trade in the two colonies of Australia and New Zealand, in relation to the total dead meat exports:—

Importation of Dead Meat (all sorts) and of Frozen Mutton from the undermentioned countries.



In each of these annual columns the portion lightly shaded represents exports of frozen mutton only—the darker portions including all other forms of meat export.

That the frozen carcass would prove a serious rival to the cooked mutton in the tin, as a mode of bringing Australian produce here, was early recognised by those in the trade. The marked contraction of the arrivals in London in 1884 from Australian and New Zealand shippers was remarked upon by the New Zealand Loan and Mercantile Agency Company in their review of the business of that year. While from 1880 to 1883

the number of cases of Australian tins had gone up from 158,000 to 276,000, in 1884 they dropped to 115,000, and this was directly ascribed to the use of frozen in lieu of preserved meat in many households in England—1884 being, as may be remembered, a year memorable for the actual tripling of the frozen supplies of the preceding twelvemonth. After a somewhat revived importation of Australian tins in 1885, the receipts of 1886 exhibited a remarkable decline—no more than 51,000 cases coming from Australia, against 209,000 in 1885. This extremity of depression did not continue; but, remembering how the frozen trade has risen from 400 to 2,000,000 carcasses since 1880, the following record of the cases of tins received in London from our Australasian colonies possesses a certain interest, and tends on the whole to support the theory just suggested. It must be remembered that beef, rabbits, and the flesh of other animals are imported in the tinned form besides mutton:—

Year	From Australia	From New Zealand
1880 . . .	157,900 . . .	16,700 . . .
1881 . . .	202,600 . . .	8,800 . . .
1882 . . .	232,200 . . .	32,400 . . .
1883 . . .	275,900 . . .	56,600 . . .
1884 . . .	115,100 . . .	31,400 . . .
1885 . . .	209,300 . . .	74,200 . . .
1886 . . .	51,400 . . .	17,600 . . .
1887 . . .	174,000 . . .	43,000 . . .
1888 . . .	126,400 . . .	60,000 . . .

NEW ZEALAND.

In a review of the frozen trade it is not, however, expedient to concentrate attention on colonies like those of Australia proper, whence, after all, so limited and so unexpansive a share of our imports come. Turning to the two sources of steadily augmenting supplies, New Zealand claims priority as the importer of the most and the heaviest carcasses.

New Zealand possesses 15,000,000 sheep, and at the census of two years back not quite 600,000 inhabitants, or 5·7 persons to each square mile of the 101,000 miles of the territory. The sheep sent to London came in 1882 from the Southern Island, but the operations were gradually extended to the Northern Island also, and have ever since been continued. The increase of sheep received here—from 8,800 carcasses to 940,000—has already been noted; but to present the latest picture of the trade and its distribution I desire to quote the following summary¹ of the frozen meat shipped from New Zealand from January 1 to December 31, 1888, which shows both the ports whence supplies

From the *Weekly Press* of February 8, 1889 (Christchurch, New Zealand).

were shipped, the distribution of the shipments among the four great carrying companies engaged in the trade, and the estimated weights and descriptions not only of mutton and lamb, but of beef also. The different figures of the mutton exports from those already quoted arise, of course, from the local record covering a later date.

Ports	Mutton			Lambs	Beef		
	Carcasses	Legs	Haunches		Quarters	Pieces	Haunches
Napier	159,666	658	7,414	12,620	4,562	78	879
Wellington	226,484	39,673	—	14,993	—	16,805	—
Lyttelton	250,377	—	—	44,040	3,352	6	—
Timaru	76,499	—	—	3,574	—	—	—
Oamaru	75,976	—	—	9,925	1,066	—	—
Port Chalmers	143,388	—	—	3,047	1,100	—	—
Bluff	36,275	—	—	3,874	1,213	—	—
Total.	968,665	40,331	7,414	92,073	11,293	16,889	879
<i>Lines of Vessels.</i>							
Shaw, Savill, and Albion Co.	364,566	17,962	—	41,022	3,695	11,393	—
New Zealand Shipping Co.	282,646	21,769	25	27,335	2,103	5,418	879
Colonial Union Co. . .	197,756	600	7,389	11,384	4,785	78	—
Turnbull Martin & Co. .	123,697	—	—	12,332	710	—	—
Total.	968,665	40,331	7,414	92,073	11,293	16,889	879

Total Weights.

Mutton	lbs.	Lambs		Beef	lbs.
		Carcasses	lbs.		
968,665 car- casses at 60 lbs. each	58,119,900	92,073 { at 28 lbs. each }	2,578,044	11,293 qrs. { at 190 lbs. each }	2,145,670
40,331 legs at 8 lbs. each	322,648	—	—	16,889 pieces	2,955,744
7,414 haunches	150,339	—	—	879 haunches	180,744
—	58,592,887	—	2,578,044	—	5,282,158

The districts and the sheep vary a good deal in character, and there has been little or no grading of the consignments in each cargo. One ship brings over many small lots belonging to different people and consigned to different agents. This want of uniformity has, it is said, frequently hindered the trade; a variation of as much as 2*d.* per lb. being noticed between

the prices of mutton forming part of one and the same cargo. The freezing is here usually done at a fixed charge to the sheepowner according to the number sent, the whole being packed and conveyed for sale to such agent as the shipper may direct; but this is not invariable. One of the companies whose success has been greatest—the Gear Meat Company—certainly buys sheep on its own account and takes the risk of the market here; but this practice, which gives strength to the River Plate trade, is not usual in New Zealand.

At the time of the last census in 1885, New Zealand had, I believe, 44 separate boiling-down and freezing works, employing 838 men, and stated to be turning out for local consumption or for export provisions roughly valued at more than half a million sterling per annum. This figure is now largely exceeded, and new works are in various places erected. The businesses of preserving meat and of freezing mutton are really separate, and only a portion of companies are largely engaged in the latter.

It may be some assistance to those who are not familiar with the different portions of New Zealand whence our supplies come, or with the names of the companies that may be regarded as most largely engaged in the frozen trade, that I should here tabulate the chief businesses :—

On the South Island

Canterbury Frozen Meat and Dairy
Produce Export Company
Christchurch Freezing Company
Oamaru Refrigerating Company
New Zealand Refrigerating Company
South Canterbury Refrigerating
Company
Southland Freezing Company

On the North Island

Messrs. Nelson Brothers, Limited.
North British and Hawke's Bay Re-
frigerating Company
Wellington Meat Export Company
Gear Meat Company
New Zealand Frozen Meat and Stor-
age Company

Some of these are more continually engaged than others, and the character of the supplies in the different provinces varies much. The last company on the list has been recently doing almost nothing in the frozen trade. But it is characteristic of the frequent changes which varying local conditions produce, that, since the close of 1888, a steamship left Auckland Harbour carrying not only 130 carcasses of beef, but also 2,860 sheep and 1,960 lambs—in all, a weight of some 2,700 cwts. This may indicate a revival of trade in this part of the North Island; but the success or failure of the enterprise as a whole can hardly be judged of by companies which, not being favourably placed for the direct London steamers, have not been prominent in the mutton trade.

Of the companies I have named three alone exported, during their respective financial years last ended, 473,000

sheep, or more than half of the whole coming to England from New Zealand. Each of these seems to be doing fairly well in the business.

The New Zealand Refrigerating Company, at Dunedin, in the province of Otago, exported 146,561 sheep; and, reporting in July last, declared a dividend of 8 per cent. Again, the large trade of the Canterbury Frozen Meat Company, at Christchurch, in the district whence the best class of New Zealand sheep is furnished, embraced the freezing of 226,000 carcasses in the year, and was so far profitable that the dividend was 10 per cent.; and the Wellington Meat Export Company, upon the Northern Island, which had frozen 101,000 sheep, as against no more than 5,000 in the previous year, seems to have paid 8 per cent. to its shareholders, giving also a bonus of 3*d.* per sheep and 1½*d.* per lamb to the shippers, and proposing still further to reduce the charges now current for freezing.

Still more conspicuously successful was another company, already named as buyers as well as freezers of sheep, the Gear Meat Company. In this case the last dividend declared was 10 per cent., while it was stated at the meeting that in six years' time 60 per cent. of the capital employed had been returned.

The ultimate test of the possibility of a largely extending trade is, of course, that of profit to all the persons concerned. In the case of New Zealand the risk of loss and the chance of gain are spread over many individuals. First we have the grower of the sheep—who, as he takes the risk of sale here in the New Zealand trade, is also the shipper; then the Freezing Company, whose services are limited as a rule to the trade at some particular port; next, the shipping companies as carriers; and, lastly, consignees on commission here. The commission charged by salesmen is, perhaps—as stated in the interesting summary of the frozen trade issued by Messrs. Wm. Weddel & Co.—the only item of cost which has not undergone diminution since the import trade began. This remains at 2 per cent., as formerly.

To the loosely organised trade arrangements in London, skilled advisers of the colonial importers, such as the New Zealand Loan and Agency Company, have long attributed the unsatisfactory prices realised. It is alleged that the present level of New Zealand prices is kept much lower in relation to the best English mutton than it need be, by defective combination among the exporters. Those, therefore, who wish to reckon with the future of the trade must bear in mind the possibility of improvements being effected in this matter, which may hereafter make the million carcasses of the New Zealand shippers more formidable competitors with our native sheep.

Besides the prospect of closer combination among those selling, the more perfect machinery used has helped to secure lower insurance charges—the premium falling from 6*l.* 6*s.* to 4*l.* per cent. ; while an actual saving in the process of freezing and of transport now secures more profit for the New Zealand exporter. In Messrs. Weddel's circular a contrast is made between the aggregate freights and charges of 1888 and those of 1883. It is claimed that services which cost 4*d.* in the earlier were effected for no more than 2½*d.* in the later year ; and it is argued that a price of 3¾*d.* per lb. to-day is nearly as remunerative to shippers as when in 1883 to 1885 as much as 5½*d.* to 6*d.* was obtained.

Now, literally speaking, to take from 3¾*d.* a sum of 2½*d.* only leaves 1¼*d.* ; while if we take the lower of the two higher earlier prices, 5½*d.*, and deduct for charges 4*d.* therefrom, there was then still left 1½*d.* Judging, however, from the price of tallow, the local or boiling-down value has also probably receded, and this must largely affect the possibilities of profit. It is scarcely recognised here, as it should be, to how low a point the local boiling-down values might recede, but for the outlet which the frozen export now furnishes.

There is no doubt, however, that the margin of cost has been reduced between the present time and the early days of the trade, to meet falling values here. I can remember a speaker at the Meat Conference held at the Health Exhibition of 1884 telling us—I have no doubt relying on the opinions of experts and authorities then engaged in the trade—that no prospective calculation would be safe which did not assume that a London selling price of 6½*d.* per lb. would be requisite to attract increased supplies, and that to sell any Australasian mutton at all profitably here, 6*d.* at least should be secured, although possibly the River Plate business could be carried on at 4½*d.* Events have not shown us that such limits may be set.

As it is useful, if we are to forecast in any way the possible future, to compare the reduced costs now with the older charges borne by imports, I shall endeavour to contrast with the present outgoings a statement which was largely commented on in the English press as lately as 1886, and which purported to show on good authority the essential unprofitableness of a trade which only secured 5*d.* per pound in England for prime New Zealand mutton. The original figures were said to have been taken from actual account sales, and their accuracy guaranteed ; they represent the charges on 1,000 lbs. of frozen mutton disposed of in London at 5*d.* The parallel charges, which I now suggest as probable, I have had checked by competent authorities here :—

	Charges on 1,000 lbs. of mutton.			
	Rate per lb.	1886	Rate per lb.	1888
Freezing	$\frac{1}{2}d.$	£ s. d. 2 1 8	$\frac{3}{8}d.$	£ s. d. 1 11 3
Petty expenses, bags, exchange, &c.	$\frac{1}{4}d.$	1 0 10	$\frac{1}{4}d.$	1 0 10
Insurance	5l. 5s. percent. on value of 5d.	1 1 0	4l. per cent. on value of $4\frac{1}{4}d.$	0 14 0
Freight	2d., and 10 per cent. primage	9 3 4	$1\frac{1}{4}d.$ and 10 per cent. primage	5 14 7
London charges . . .	$\frac{1}{2}d.$	2 1 8	$\frac{1}{2}d.$	2 1 8
		15 8 6		11 2 4
Since the estimated loss in weight is 5 per cent., there is for sale 950 lbs. only, at	5d.	19 15 10	$4\frac{1}{4}d.$	16 16 6
Remaining to remunerate grower on each 1,000 lbs. of mutton . . .	...	4 7 4	...	5 14 2

Unless, therefore, I have made some error in the items of my estimate, it is clear that the existing charges have been reduced somewhat more than the price, and that there remains, with mutton at only $4\frac{1}{4}d.$ in London, a larger surplus to the local grower than when 5d. was being received. If, therefore, the trade, however short of the original hopes of the growers, was capable of being maintained and expanded through two such years, it is clear that at the present values it can still be carried on.

A search in some of the more recent colonial papers furnishes illustrations of the so-called sustaining power of the frozen trade as an outlet previously unknown to the New Zealand flockmaster.

In the province of Canterbury, whence the very best class of our supplies come, the current market reports of the *Lyttelton Times*, on January 24, 1889, quote the top price of the day for "very prime wethers" as 10s. 4d., and half-breds at 8s. 5d. But these values were, it is acknowledged, affected by an incident which had caused a sudden cessation of the freezing demand at that particular spot. That incident was the burning of the Belfast works of the Canterbury Freezing Company early in December. The works had been engaged up to nearly their full capacity for some time in advance, and the directors had taken steps to obtain a vessel with freezing appliances on board, to enable them to tide over until new buildings could be reinstated.

Yet, although other works were also utilised, no little dislocation of trade was occasioned, and values all round were affected. To show how the markets suffer by even a temporary check to frozen business, when once it has been established, I quote the report of Messrs. Matson & Co., who show how on the above-mentioned day they sold at Lyttelton—

“On account of Mr. J. Dixon, cross-bred wethers at 10*s.* 2*d.*; account Mr. Mason, cross-bred wethers at 9*s.* 9*d.*, merino wethers at 5*s.* 11*d.*; account Mr. W. F. Somerville, 183 cross-bred ewes at 6*s.* 6*d.* to 7*s.* 4*d.*, three pens lighter sheep at 5*s.* 9*d.* The best mutton barely touched 1½*d.* per pound at any part of the sale, good wethers selling at an average of a little over 1½*d.*; ewes and inferior quality generally about 1½*d.* In fat lambs there was another crowded market, the quality generally being good. For freezing purposes there were less bought than last week; in fact, there was so little done in this direction that its effect was scarcely felt. Unable as the local buyers were to absorb the heavy entry, the sale was weak, irregular, and marked by a very dull trade, various lines being withdrawn, while the day's prices showed a further drop all round. Lambs, which three weeks since would have sold at about 8*s.* 6*d.*, sold yesterday at 7*s.* to 7*s.* 6*d.*, and so *pro rata* through the different grades of quality. To have a correct idea of the effect which the export trade has upon our local values here, one has only to turn to the different market quotations, i.e. at the time when the Belfast Works were in full swing, and buyers came regularly into our weekly sales to meet their requirements for this source, and the present, when there is virtually no such demand, on account of the collapse by fire of the factory above referred to. Between the rates as ruling in the early part of December and now there is at least a difference of 2*s.* 6*d.* per head in fat sheep, and a less proportionate amount on lambs, inasmuch as the few engagements still existing on the part of shippers have been pretty well filled by lambs.”

The market level is, therefore, patently affected by the withdrawal of the demand for freezing for transport to England by quite half-a-crown a sheep; and this, on a set of values averaging below 10*s.* a head, is clearly a matter of great importance to the growers. Yet another report from the same quarter says:—

“There were no buyers for export worth mentioning, consequently freezers suffered more than fair quality butchers' sorts, the latter being more easy to quit than last week. Prime lambs sold at from 7*s.* 6*d.* to 8*s.* 6*d.*, medium 5*s.* 6*d.* to 7*s.*, inferior 4*s.* 10*d.* Several lines of good quality wethers were yarded, but these met with even less inquiry than fat ewes, there being absolutely no demand whatever for exports. We expect values to still further recede. Mutton sold at from 1½*d.* to barely 1½*d.* per pound.”

And yet another, pointing to the absence of the previously existing demand for lambs, says:—

“The lambs offered were principally heavy-weights, and very good quality. Several excellent freezing lines being yarded, unfortunately the demand for freezing was *nil*, and the butchers were unable to cope with the large numbers sent forward. Prices, consequently, receded, and a large number were withdrawn from sale owing to prices not reaching vendor's expectations.”

In a series of interesting notes on the British farmer and his competitors, Mr. W. E. Bear inclines strongly to condemn as unprofitable the frozen trade. His confidence in its necessary failure I confess I hardly share. He seems to anticipate great restriction, if not extinction, of the export, unless the values of 1886 improved. The *Otago Witness* was cited as maintaining that shippers, after paying for freezing, freights, and charges, had no margin left over the local boiling-down price, and that early in 1886 some of the largest exporters had announced that it would not pay them to send their mutton to England. One case was mentioned where no less than 40,000*l.* had been spent in preparing for the trade, and where it was nevertheless given up because the sale of the mutton here at only 4*d.* a pound could not pay. Individuals may doubtless have suffered in this way, but even the still lower prices of 1887 have, it seems, by no means checked the growing volume of the trade itself.

Low prices only provoke new efforts at reducing the cost of freezing and of freight, and there have been very recent attempts to secure continuous contracts at extremely low figures.

The Wellington Company I have already referred to announced, I believe, last July, that they were prepared, owing to the satisfactory year's working, to reduce the freezing charges from $\frac{1}{2}$ *d.* for mutton and $\frac{5}{8}$ *d.* for lamb, to $\frac{3}{8}$ *d.* for all; and this, with the $\frac{1}{4}$ *d.* reduction on freight obtained at an earlier date, makes a saving to shippers of over 2*s.* per sheep.

In a recent number of the *Sydney Mail* (January 5, 1889) I find, in an account of the New Zealand mutton trade, it is asserted that the Frozen Meat Company of Christchurch had actually entered into an arrangement for a term of years, giving a guarantee to the colonial grower of a minimum price of 2 $\frac{1}{4}$ *d.* per lb. f.o.b. frozen—a far higher return than that above referred to, and one considerably above the level shown in the market reports of the same province.

My own information leads me to believe that the contract in question was not ultimately accepted by, although offered to, the company named. But, if this were so, it affords all the stronger evidence of the confidence of the shippers in the future of the existing trade; and, as the details given illustrate the position and possibilities, I quote the figures here:—

“On this basis a 60-lb. sheep would realise to the grower, after deducting the freezing charges, 1 $\frac{1}{8}$ *d.* per lb., or 9*s.* 4*d.* net; the skin would average 3*s.* 6*d.*; the fat, say, 1*s.* 3*d.*—or a total of 14*s.* 9*d.* per sheep. This, it is pointed out, is the lowest price which the colonial grower could realise for his sheep. The various items are as follows:—

Meat	2½d. f.o.b. frozen.
Freight	1d.
London charges, '34	
Insurance, '16	0½d.

Total cost of meat . . . 3¾d. per lb. f.o.b.

Any increase of price above 3¾d. is to be divided between the London agents (in this case Nelson Brothers) and the shipping companies, in the proportion of $\frac{1}{5}$ to the former and $\frac{4}{5}$ to the latter, until meat reaches 4½d. per lb. After 4½d. per lb. any increase in price to be divided as follows:—Growers, 40 per cent.; the shipping companies, 50 per cent.; and Nelson Brothers, 10 per cent. After 5d. per pound, growers to get 80 per cent.; the London agents, 20 per cent.; but the ships not to participate after 5d. The effect of the proposal would be as follows:—

	d.	Growers d.	Ships d.	Nelson Brothers d.
Meat selling at 4 gives . . .		2.25 . . .	1.20 . . .	0.55
" " 4½ " . . .		2.25 . . .	1.30 . . .	0.575
" " 4¾ " . . .		2.30 . . .	1.3625 . . .	0.5876
" " 4½ " . . .		2.40 . . .	1.4875 . . .	0.6125
" " 4¾ " . . .		2.50 . . .	1.6125 . . .	0.6375
" " 5 " . . .		2.60 . . .	1.7375 . . .	0.6625

"An arrangement has also to be made for meat of second and third quality."

On February 13 last, the *British Australian*, published in London, reported from Wellington, in the North Island, to the effect that Messrs. Nelson Brothers of Napier had offered to establish new freezing works at Gisborne, and give a minimum net price of 1½d. per lb., and half the surplus over 4d. obtained in London; a guarantee of 16,000 sheep per annum for three years being required by the firm. At a meeting of sheep-farmers the offer was said to have been favourably received, and a guarantee of 10,000 given in the room. Here we have apparently an expression of content to accept 1½d. as a three years' local minimum.

No doubt the short but remarkable spurt in prices in July and August of last year has given heart to some previously desponding shippers. While the temporary boom lasted, a good illustration of the resultant effect of even slightly higher prices for frozen meat here on land values in New Zealand appeared in the *Standard* of October 9 last, wherein, on the information supplied by an extensive New Zealand landowner and farmer, it was asserted that there was great rejoicing among his class at the improved prospect for the sale of frozen meat in this country, owing to the coincidence of a reduction in expenses and a rise in prices. According to this authority, the mere fact of meat selling in London at 4½d. to 5½d. per lb. throughout a year would restore the price of land in New Zea-

land from its depreciated value to the extent of 20 to 30 per cent. On the strength of the trade improvement of last autumn, this gentleman had already sold three farms at 10*l.* 10*s.*, 15*l.*, and 16*l.* an acre respectively, after having failed to obtain a satisfactory offer during seven years. So strong was the faith in the future of the frozen-mutton trade which was held, that he was keeping 14,000 sheep on turnips, while a neighbour had 36,000 being so fed, 15,000 of them being fat wethers. Since the beginning of 1888 this one New Zealand flockmaster had, it seems, shipped 34,000 carcasses of sheep and lambs, obtaining the advantage of the summer rise in price on a considerable proportion of that great number.

ARGENTINE.

The trade in frozen mutton from the River Plate is, however, the youngest of the two forms of competition with which alone British farmers need seriously concern themselves. It may be said to have practically assumed dimensions entitling it to notice only in 1883, and is conducted in a manner wholly diverse from the New Zealand trade. In New Zealand the freezing and shipping interests are distinct, as a rule, from those of the stock-owners, who have their sheep frozen at one fixed rate, and sent here at another, themselves retaining ownership of the mutton and risking the commercial return on the shipments made.

In the Argentine Republic the trade is practically concentrated in four hands, and I believe that number is about to be reduced to three. The exporting companies buy, either on standing contracts, or from time to time on the *estancias* or at the markets, the sheep they want; they freeze in works situated in different Argentine centres, charter the vessels, and themselves receive, store, and sell at their discretion in the English markets.

At present the companies engaged are the River Plate Fresh Meat Company of London, represented by Messrs. Drabble Brothers on the other side; Messrs. S. E. Sansinena & Co., who are represented both in Liverpool and in London; Messrs. James Nelson & Co. of Liverpool; and Messrs. Terrason—the last-named firm a French one, I believe, buying and freezing in the Argentine territory, and consigning to agents here the produce of their works. The probable absorption of this business by Messrs. Nelson is reported.

The freezing stations of these companies now in operation are situated at some distance from each other, but all in the

province of Buenos Ayres, whence, indeed, it may be said the whole Argentine exportation comes. Messrs. Nelson freeze at Zareta. The station of the Messrs. Sansinena is at Barracas, in a suburb of the city of Buenos Ayres itself, where about 1,000 carcasses are frozen daily and shipped direct from the wharf adjoining. The River Plate Fresh Meat Company possess one station—closed from cholera in 1886, and not now working—at Colona, on the opposite side of the river and in the territory of Uruguay; but their regular freezing establishment is at Campaña, about 160 miles higher up the river than Buenos Ayres, and they ship their supplies from that point. The Terrason establishment lies still further north, at San Nicolas—almost on the border of the province of Santa Fé, and many miles above Buenos Ayres.

The sheep are, in the case of the Barracas consignments, for the most part drawn from the southern and western parts of the Buenos Ayres province, or from the immediate neighbourhood of the city. As we are apt here to overestimate the possible export from a country so rich in sheep, we should not forget that it is never reckoned that more than ten per cent. of any given flock of sheep can be counted on as fit for freezing in one year, and contracts for the supply of 2,000 or 10,000 sheep a year are now what are being made from the owners of flocks numbering 20,000 or 100,000, as the case may be, subject to a right of selection, and with an option to the owner to sell fewer if the taking of the full number would denude his flock of all his best animals. Only wethers are frozen, and the weights of these are, on the whole, improving under the impulse of good stock imported from our own country. The frozen sheep landed here by Messrs. Sansinena, after a good year, average as high as 48 lbs. apiece; those of the River Plate Company not much over 42 lbs. to 44 lbs. each. On March 8 last, indeed, I myself saw in Smithfield Market a number of carcasses of a far higher weight than this imported from Buenos Ayres by the “Heliades,” and, having the curiosity to have one of these unusually large carcasses weighed, I found it turned the scale at 10 st. 2 lbs. On inquiry I found this steamer brought 6,585 carcasses averaging 61 lbs. weight apiece, and 6,083 averaging 52 lbs. This shows what may be done, so that we must not count on the perpetual inferiority of the River Plate mutton.

The bulk of the whole trade of these companies still comes to this country; but in recent years Messrs. Sansinena have been shipping also carcasses to France, and have effected a footing in the Paris market. The relative importance of the firms engaged may be gauged by the following figures, quoted from a

Buenos Ayres paper, *La Prensa*, of January 1, 1888, as showing the export of very nearly a million carcasses in the year 1887 :—

Sansinena	360,000, for export only. ¹
Drabble	282,000
Terrason	184,492
Nelson	170,000
<hr/>	
Total	996,492 carcasses.

Allowing for the sheep despatched from Buenos Ayres in the last month of the year, which would only come here in the following January, it would seem, if this Argentine record is correct, that something like $\frac{3}{10}$ of the export finds its way to other than British markets.

The supply directed to Paris was, a year ago, coming in at a rate of about 10,000 carcasses a month. There is, however, a serious obstacle to the development of a French trade sufficiently large to divert any considerable portion of the Argentine quota from our ports. The duty on mutton from the River Plate entering France, which stood at 7 centimes in 1885, has been raised to 12 centimes per kilogramme, or 12 francs per 100 kilos.—that is, over $\frac{1}{2}d.$ per lb.; while the charge for the somewhat elaborate and tedious process of inspection at the port adds another franc to the duty. The tariff under the conventional arrangement, however, between France and Germany allows of the entry of frozen sheep or other dead meat from the latter country at one fourth of that rate of duty. The Plate sheep must therefore, and as a matter of fact do, encounter considerable competition in the Paris market from German sheep killed at or beyond Strasburg. I found that the latter were last summer arriving in no inconsiderable quantities, and were disposed of to purchasers at certain of the railway termini, without even entering the central market of the “Halles.” The dimensions of the German trade have been given me as 500 carcasses daily—half as much again as the Argentine sales—and about 15,000 per month. The River Plate sheep entering France direct by Havre have an advantage over those of New Zealand, which have a more costly journey to make, and have to be transhipped in London. An attempt made to start the latter trade has not proved successful.

The English arrivals from the Plate are practically directed to two ports, London and Liverpool, the latter taking now four fifths of the whole; but certain shipments have been lately received in Glasgow, and one at least I observe is entered as touching at

¹ Besides 240,000 for local consumption in Buenos Ayres.

Newport with sheep for Cardiff, where and at Birmingham, as well as at Glasgow, Liverpool, and London, proper cold stores are now available for keeping supplies. Taking account, however, only of the chief centres of receipt, whence a large distribution is now made by rail to other places, the Argentine imports for the past six years have been thus distributed:—

Year	Carcasses imported from the River Plate		
	Into London	Into Liverpool	Total
1883	17,165	—	17,165
1884	108,823	—	108,823
1885	190,571	—	190,571
1886	331,245	103,454	434,699
1887	242,903	398,963	641,866
1888	169,282	754,721	924,003

It is evident from the above that, since 1886, when consignments were first made to Liverpool, that port has become the great centre of the Argentine trade. Compared with the previous years, the number of carcasses sent to London in 1888 exhibits a considerable reduction, while as respects Liverpool the number of frozen sheep received from the Plate in 1888 was very nearly twice as great as in 1887.

For the year 1888 the following statement discriminates the proportions furnished by the several exporters of Argentine mutton, and their ports of arrival here. Liverpool, it will be seen, is most favoured by all, the River Plate Fresh Meat Company sending less than a tenth of their cargoes to London.

Frozen sheep imported	Total	Of which at	
		Liverpool	London
By Sansinena	187,078	115,449	71,629
„ Nelson	245,638	190,740	54,898
„ River Plate Fresh Meat Co.	300,940	276,080	24,860
„ Terrason	182,619	165,986	16,633
Total	916,275	748,255	168,020

These figures represent entire carcasses only, and to them must be added, to bring them up to those shown above, the half carcasses and quarters occasionally shipped.

Perhaps too much has been argued from the published balance-sheets of companies both in this and the New Zealand trade as to the initial losses which invariably overtake the pioneers of such trades as this. Very many circumstances only indirectly connected with the business itself go to make the loss

or profit of companies. It may have been argued that, in such a case as that of the River Plate Fresh Meat Company, where the accounts published in 1887 showed a debit balance of 42,000*l.*, and where 3*l.* per share was written off in respect of capital lost, the stoppage of their efforts must ere long follow. Yet I see this company keeps steadily raising the number of carcasses exported, from 191,712 in the year ended April 1886, to 219,318 in that ended April 1887, to 288,616 up to the same date of 1888, and to over 300,000 in the year ended December last. While the loss on shipments was set down as 22,387*l.* in 1887, with prices ranging here no higher apparently than 3 $\frac{3}{4}$ *d.* per lb., that is changed to a profit of 3,202*l.* last year, prices remaining level.

What stimulus, if any, the new bounty voted by the Argentine Legislature may have had on the exports of the past year has yet to be seen. The sum is declared in some quarters to be so small as to promise little material result from the first proposal, which was to give 6 dollars for every ton of frozen mutton exported, and 20 dollars for every ton of beef.

The clauses of the Decree which bear on the question of the bounty are as follows:—

“1. Let the sum of 500,000 dollars be set aside each year during the term of three years, to be reckoned from January 1, 1888, with a view to encourage the exportation of live cattle, and of beef and mutton preserved in tins by the refrigerating process, and of other preparations which in the opinion of the Executive are deserving of that concession, and for subsidies and prizes at rural exhibitions and fairs, and this sum shall be distributed as follows:— For premiums on the exportation of live cattle, or of beef preserved by the cold process in tins, or of other preparations which in the opinion of the Executive may be deserving of this concession, 250,000 dollars annually. For premiums on the exportation of mutton preserved by cold process, 150,000 dollars yearly. For subsidies and premiums to rural exhibitions and fairs, 100,000 dollars in each year.

“2. The amounts which may be destined for the exportation of live cattle and of frozen and preserved meats shall be distributed amongst the respective exporters in the rates of 20 dollars for every 1,000 kilos. of beef, or of 3 dollars for each live bovine animal which may be exported, and of 6 dollars for every 1,000 kilos. of mutton, and shall be liquidated and paid quarterly, on previous presentation by the interested party of documents proving the shipment of the meat.

“3. There shall be no right to the premiums set forth in the foregoing articles:—1. When the entire quantity of meat or of live cattle shipped during the quarter by one person or company shall not exceed that of 5,000 kilos. of meat or of 25 live cattle; 2. When the live cattle or preserved meat shall be destined for the provisioning of a vessel for a voyage; 3. When the live cattle are exported by land, or to ports situated between the Capes.”

To remunerate the producer and stimulate the development of the frozen mutton trade, the funds voted for this bounty of

6 dollars per ton were assumed to suffice for 16,600 tons, expected to be thus benefited. As I have shown, the receipts here of Argentine mutton have now reached a figure even beyond this. Whether the small bounty had any effect or not, it is clear that the Argentine Government were right in their forecast of a large addition to the trade.

In the message of the President of the Argentine Republic certain details were given in justification of the proposed bounty. In these it appears the cost of a sheep in Buenos Ayres is put at 2 dollars 20 cents, from which there are deductions of 15 cents for tallow and a dollar for the skin, leaving the value of the carcass, estimated at 40 lbs. only, as 1 dollar 5 cents. In gold dollars the expenses are reckoned thus:—

	<i>§</i>	<i>c.</i>
Carcass, 40 lbs.	0	84
Freezing	0	42
Freight and packing	1	15
London expenses	0	42
Cost in London	2	83

Now this cost represents $3\frac{1}{2}d.$ per lb. here, which is just the full price that many carcasses have been selling for of late, and the small reduction which the bounty would give would not appear to leave much margin for profit on the transaction. But probably the idea was, that could a sufficient trade be kept up for a time, there would be greater competition brought into the carrying trade, and a fall in freights induced. As the President spoke of sixteen steamers engaged in the business, while there are twenty-three now employed, this result may have been secured.

In a despatch, dated the 7th November last, Her Majesty's Chargé d'Affaires at Buenos Ayres reports that, so far as the beef export trade is concerned, an extension of the system of bounties on factories engaged in the export of meat has been effected. Mr. Jenner says:—

“Congress has authorised the Argentine Government to guarantee interest at the rate of 5 per cent. on a capital of eight million dollars for the term of 10 years, to be invested in establishments devoted to the export of beef. It is estimated that the value of the 20 million head of cattle existing in the Argentine Republic cannot be less than 150 million dollars, and that of the 20,000 square leagues of land devoted to cattle-breeding amounts to at least 600 millions of dollars. The total capital engaged in this industry is, therefore, scarcely less than 750 million dollars, or 100 million pounds sterling, at the present rate of exchange. Under these circumstances, the call for a Government guarantee of 400,000 dollars, or about 53,000*l.*, points to a state of things scarcely creditable to the wealthy and influential class of men in whose supposed interest the guarantee has been granted.”

Whatever the new bounty which our *Chargé d'Affaires* ridicules in these terms may do, it applies to beef exports only; and, although I have received the full text of the law and regulations for the distribution of the funds, it is not necessary for the purpose of this paper to quote them. Recent Buenos Ayres advices, however, indicate that the scheme of the late Finance Minister, Dr. Pacheco, which he has avowed was a "frank and open protection of a great national industry," is attracting new capital into the freezing trade, although I believe it is held that only public companies, and those which submit a very detailed statement of their finances to the Government, can share in the guarantee.

With or without the bounty, and with or without apparent profit, the continual increase from the Plate ports is a feature we have now to reckon with as regards this form of competition.

Of the vessels engaged in the Argentine trade nine are chartered by Messrs. Sansinena; the other importers having four or five apiece. The fleet now employed has a carrying capacity of at least 347,000 carcasses, and, allowing for the usual number of voyages made, it should be able to carry over a million sheep a year. This figure has been very closely approached in 1888. The time occupied is from 30 to 35 days, and the present cost of freight, so far as that can be made out, seems about 1*d.* per lb. Assuming that the cost of freezing and packing, and selling here, could be reduced to another penny, there would remain whatever was earned over 2*d.* per lb. to divide between the grower and the importing company.

COMPARISON OF PRICES.

No record of the development of the trade would be complete which omitted a comparison between the course of prices of our own mutton here and the frozen arrivals over the period since the new imports were developed.

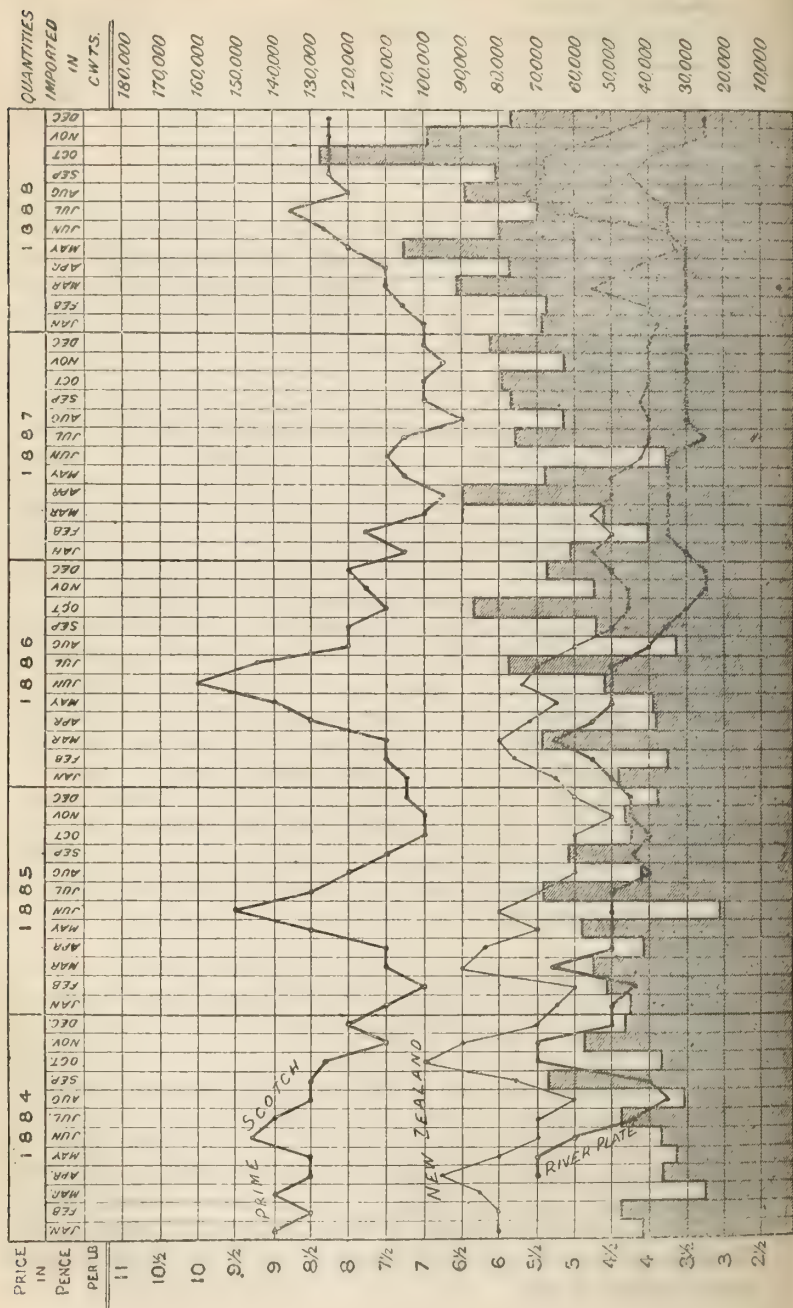
As a matter of fact, the highest reported prices for any frozen meat were those of 1883, when British mutton too was high. New Zealand lamb, at its highest level in that year, fetched 9*d.* a pound in London, and ordinary mutton 8*d.*; but the range was great, for the lowest recorded values of the same year—4½*d.*—are only 1*d.* above the present level. The following quotations, taken for the first four items from the records of the New Zealand Loan and Mercantile Agency Company, may show the relative course of average prices per lb. throughout the last six years for the best description of each of the following grades of mutton, placing prime Scotch and English at the head of the list for contrast;—

Year	Prime Scotch	Prime English	Prime New Zealand	Sydney	River Plate
	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
1883	9 $\frac{1}{2}$	9	7	6 $\frac{8}{9}$	—
1884	8 $\frac{3}{4}$	7 $\frac{3}{4}$	6	5 $\frac{1}{2}$	4 $\frac{9}{10}$
1885	7 $\frac{3}{4}$	7 $\frac{1}{8}$	5 $\frac{5}{8}$	4 $\frac{7}{8}$	4 $\frac{2}{3}$
1886	8 $\frac{1}{2}$	8	5 $\frac{1}{2}$	4 $\frac{5}{10}$	4 $\frac{3}{10}$
1887	7 $\frac{1}{2}$	6 $\frac{1}{2}$	4 $\frac{1}{2}$	4	3 $\frac{7}{10}$
1888	7 $\frac{1}{8}$	7 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{12}$	3 $\frac{7}{10}$

The best English mutton, it will be seen, has fallen very little since 1884, although there was a notable drop between that year and 1883. The best New Zealand, which lost less between 1883 and 1884, or only 1*d.* per lb., has lost 1 $\frac{1}{2}$ *d.* since that date; while the best English mutton is lower by a single farthing per lb. only, or just one sixth of this rate of decline. Between 1883 and 1888, while the best of our mutton has lost 1 $\frac{1}{2}$ *d.* per lb., the price of New Zealand sheep has fallen away by 2 $\frac{1}{2}$ *d.*, and Sydney mutton by 2 $\frac{3}{4}$ *d.* The margin of fluctuation in the River Plate sheep would seem to have been less, although the level all through has been lower. The price quoted for 1884 was under 5*d.*, and the 1888 price is under 3 $\frac{3}{4}$ *d.*, so that about 1 $\frac{1}{4}$ *d.* here represents the decline.

A very useful and complete diagram was published last winter by Messrs. Weddel & Co., which enabled a continuous contrast to be given of the prices of all the several grades of home and foreign mutton. I am unable to condense that diagram here, although I should have liked to do so; but I venture to invite attention to that I have roughly drawn on page 234, which records for the past five years a monthly price for prime Scotch, prime New Zealand, and River Plate mutton, and is so constructed as to show the monthly arrivals of the frozen mutton in each month of the period. We may thus trace the effect on prices of the supplies which the dark portion of each column represents.

So little do the foreign arrivals affect prime values here that, comparing the quoted prices of New Zealand with those of the best Scotch mutton in London, it may be observed that the maximum and minimum were sometimes reached at opposite points. Thus, in the year 1886, Scotch values were lowest in January and highest in June, with a quotation touching 10*d.*; but the New Zealand arrivals reached their highest point, or 6*d.*, in spring, and their lowest, 3 $\frac{3}{4}$ *d.*, in the autumn. In connection with these fluctuations it is well to note that March usually sees the lowest stock of frozen mutton in London, and October the largest, and the autumn prices of the frozen cargoes nearly always droop.

Five Years' Prices and Imports of Mutton.

Occasional accumulation of stocks has often caused uneasiness to the importers, for charges for storage are a matter of importance. The record of so great a stock as 99,000 frozen carcasses awaiting purchasers at one time in London in October 1885 was regarded as alarming to the trade; but much larger stocks have occurred since then. June 1887 acknowledged an accumulation in London of no fewer than 200,000 carcasses; a fortnightly stock-taking rarely showed less than 110,000 throughout that year, and for only about one month in the entire year was the stock here under 100,000 carcasses.

Still more embarrassing was the position when 1888 opened, as it is said there were then 140,000 frozen sheep. Despite a growing importation, there do not seem to have been equally heavy unsold accumulations at some later dates, but that remaining at the end of December was larger, 191,000 carcasses. Prices showed a rise of considerable importance in summer—the July level being 43 per cent. above January; but this was followed by a steady decline in the later autumn and winter, so that the year ended with prices very nearly as low as when it began.

Quoting in stones of 8 lbs. from the valuable circulars of the New Zealand Loan and Mercantile Agency Company, and throwing the data into tabular form, a good picture may be obtained of the course of values, and of the conspicuous difference displayed in the relative firmness in price of the best home mutton over that of mutton from abroad, which, as usual, fell towards the end of the year. (See Table on page 236.)

At the commencement of the year 1888, the mild weather of January was believed to have retarded the frozen sales, and prices drooped, the country markets keeping a higher level than London. A month later both these features were reversed: a slight rise took place in London, while country prices remained stationary. A concentration of frozen supplies in fewer hands than usual in March promoted a further rise in New Zealand imports; but the River Plate mutton, of which supplies were plentiful, remained cheap. May again saw a check in value. At the end of six months the London stocks were down to 90,000 carcasses, and the rate of consumption was apparently rising; the arrival of the "*Selebria*" with a cargo of 24,000 damaged, and in part jettisoned, apparently helped a revival, which caused prices to touch a higher level than had been reached since the middle of 1886. The stocks were reduced to some 40,000 carcasses in August, and 5*d.* and 5½*d.* per lb. were the prices quoted. The usual autumnal arrival of Dutch mutton once more augmented supplies, and the frozen trade, sensitive as it is to the smallest competition in the lower grades, again dropped

BRITISH, CONTINENTAL, AND FROZEN MUTTON PRICES IN LONDON, PER 8 LBS. IN 1888.

1888	Prime Scotch wethers	Prime English wethers	English ewes	Town-killed Foreign	Continental	Prime selected New Zealand	Average New Zealand	Inferior New Zealand	Prime Sydney	Prime River Plate	New Zealand lamb
Jan. 13 .	4/0 to 4/8	4/0 to 4/6	3/2 to 3/6	3/2 to 4/0	3/6 to 4/0	2/7 to 2/8	2/5 to 2/6	2/2 to 2/4	2/2 to 2/4	2/0 to 2/4	—
Feb. 24 .	4/2 „ 4/10	4/6 3/8 „ 4/0	4/0 „ 4/2	4/0 „ 4/2	—	2/8 „ 2/9	2/6 „ 2/7	2/4 „ 2/5	— 2/4 2/2	2/2 „ 2/4	4/4 to 4/6
March 24 .	4/6 „ 5/0	4/4 „ 4/10	3/10 „ 4/0	4/0 „ 4/4	—	2/10 „ 3/0	2/8 „ 2/9	— 2/7	2/6 „ 2/8	2/3 „ 2/4	4/0 „ 4/6
April 21 .	4/0 „ 4/8	4/0 „ 4/6	3/8 „ 3/10	3/8 „ 4/0	—	2/10 „ 3/0	2/7 „ 2/9	— 2/6	2/5 „ 2/6	2/4 „ 2/5	3/8 „ 4/6
May 19 .	4/4 „ 5/0	4/2 „ 4/10	3/8 „ 4/0	4/2 „ 4/4	—	— 2/10	2/8 „ 2/9	—	2/5 „ 2/6	2/4 „ 2/5	3/4 „ 4/0
June 16 .	5/0 „ 5/4	4/8 „ 5/2	3/10 „ 4/4	4/6 „ 4/10	3/4 „ 4/4	3/2 „ 3/3	2/10 „ 3/0	2/8 „ 2/9	— 2/7 2/4	2/4 „ 2/6	3/8 „ 4/2
July 14 .	5/2 „ 5/8	5/0 „ 5/4	4/0 „ 4/4	4/8 „ 5/0	3/8 „ 4/4	3/3 „ 3/4	2/11 „ 3/0	2/8 „ 2/10	— 2/8 2/4	2/4 „ 2/6	4/0 „ 4/4
Aug. 11 .	4/8 „ 5/0	4/4 „ 5/0	3/8 „ 4/0	4/0 „ 4/8	3/4 „ 4/4	— 3/8	3/6 „ 3/7	— 3/5	— 3/4 3/0	3/0 „ 3/4	—
Sept. 7 .	5/4 „ 5/6	— 5/0	—	3/10 „ 4/0	—	— 3/8	3/6 „ 3/7	—	— 3/2 3/0	3/0 „ 3/2	—
Oct. 6 .	5/4 „ 5/6	5/0 „ 5/2	4/0 „ 4/4	3/10 „ 4/10	3/10 „ 4/8	— 3/6	3/5 „ 3/6	3/2 „ 3/4	3/1 „ 3/2	2/10 „ 3/2	nom.
Nov. 3 .	5/0 „ 5/6	4/6 „ 4/10	3/6 „ 3/10	3/4 „ 4/6	3/0 „ 4/4	3/2 „ 3/4	2/11 „ 3/1	2/9 „ 2/10	2/5 „ 2/7	2/3 „ 2/6	nom.
Dec. 1 .	5/0 „ 5/6	4/10 „ 5/2	3/10 „ 4/0	4/2 „ 4/8	3/4 „ 4/8	2/9 „ 2/10	2/7 „ 2/8	2/5 „ 2/6	— 2/4	— 2/4	nom.

TABLE SHOWING PROPORTION OF ARRIVALS FROM THE UNDERMENTIONED COUNTRIES IN EACH MONTH.

Month	1886					1887					1888				
	Holland	New Zealand and Australia	Argentina	Other countries	Total	Holland	New Zealand and Australia	Argentina	Other countries	Total	Holland	New Zealand and Australia	Argentina	Other countries	Total
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
January . .	6,530	20,684	19,739	1,743	48,696	7,695	28,730	22,729	1,875	61,029	8,195	35,324	17,690	7,185	68,394
February . .	1,865	19,079	12,506	1,484	34,934	3,002	26,447	10,059	120	39,628	2,945	24,153	39,770	2	66,870
March . . .	1,840	51,083	14,080	2,095	69,098	3,345	30,340	19,545	90	53,320	3,068	71,799	15,788	171	90,826
April . . .	1,037	25,417	9,353	2,141	37,948	465	54,250	18,639	16,609	89,963	1,609	45,143	26,682	1,957	75,391
May	710	27,846	10,184	437	39,177	585	33,505	33,864	4	67,958	1,324	73,802	28,996	1,168	105,290
June	981	33,452	17,446	82	51,961	523	30,977	3,400	1	34,901	927	35,481	33,927	5	70,340
July	1,696	36,856	20,099	18,114	76,765	255	39,848	35,749	106	75,958	2,526	31,108	24,572	472	58,678
August . . .	1,711	25,946	5,326	14	32,997	1,251	38,962	19,309	3,296	62,818	4,071	49,690	25,231	300	79,292
September .	2,555	37,246	12,857	7	52,665	4,780	41,413	22,521	7,157	75,871	7,405	31,230	32,021	8	70,664
October . . .	7,067	44,626	34,608	71	86,372	9,997	46,621	21,961	101	78,680	18,275	62,645	46,264	29	127,213
November . .	12,656	30,047	10,688	288	53,679	16,590	28,521	17,697	3	62,811	21,291	53,678	24,185	45	99,199
December . .	13,415	31,035	23,523	24	67,997	14,399	41,675	25,800	30	81,994	16,143	29,064	31,680	41	76,928

from the middle of October to the year's end, when the value of prime New Zealand mutton was once again 4*d.*, the price of the River Plate sorts falling to 3½*d.*

The monthly fluctuations of arrivals of fresh mutton deserve to be studied, not only to trace the effect which the rivalry between Continental and other supplies has on the frozen meat prices, but as a possible guide to our own flockmasters in search of any cause of price fluctuation. I therefore indicate the monthly course of the past three years' trade by the Table printed on page 237.

These sketches of the course of values and supplies show how slight an incident prevents importers realising their hopes. They show, too, if read with the tables of price, or if the curves in the diagram on page 234 are studied, that there is practically no competitive action between the frozen imports and the highest qualities of Scotch or English mutton. With all the lower grades they undoubtedly compete, and the wide gap between the maximum and minimum of prices is rendered wider.

So far as the trade has developed, it has manifested a staying power, while its local promoters have shown a persistency, and the shippers and inventors an ingenuity, which warn the English farmer he must not disregard the chance of its expansion. But the history of the trade and of the traders suggests little risk of frozen mutton materially affecting the value of high-class stock here. The inevitable moral to be drawn is a very old one—the essential permanence of the market for good native mutton, but the growing risk of lowered prices for any inferior produce.

After what has happened in the way of cheapening the processes of distribution, and reducing the cost and time of carriage, it would, of course, be idle to assume that the currents of international competition in mutton to be considered in the future will be the same as in the past, or that no new changes can be looked for. Over the whole world's surface sheep are decreasing where men are plentiful, and increasing where they are scarce. In the long run some will find the means to adjust the supply to the demand. A surplus in one country, or an increasing deficit in another, may derange any forecast.

It was said once, I believe, in Australia that perhaps China or Japan might welcome an import of frozen sheep, but I am unaware of any reliable figures which would throw light on such a possibility.

Looking to the success of the New Zealand flockmasters in developing their export trade, I suppose I ought not to overlook a somewhat vague proposal to find some foreign outlet for their mutton elsewhere than in catering for the wants

of the mutton-eating people of Britain. A story was prevalent two years ago that California had been invaded, despite her own 6,000,000 sheep, and that the frozen produce of the New Zealand pastures was actually selling in the streets of San Francisco. How the venture ended, if it was ever seriously made, I am unable to say; but rumour stated that in the contract for the mail service between San Francisco and New Zealand the steamers employed should all be fitted with refrigerating chambers. Perhaps the now ordinary use of these appliances for the preservation of the ship's own provisions was magnified out of its true dimensions.

It should also be mentioned that frozen mutton from Texas reached London in January 1887, there being at least one shipment by the "Rowena" from the port of Galveston. The carcasses, however, were of a thin, small, merino type, and only 4,500 in number. As they sold for 3*d.* to 3½*d.* per lb. only, although described as in good condition, this would not appear to be exactly a favourable reception for a new trade; and though I have heard it declared that the shippers of the Antipodes must not regard it as impossible that large Texan competitive imports may be received in the near future, I have seen no reason to expect realisation of the prophecy. Nor could it be easy to reconcile the anticipation with the reports of the Agricultural Department at Washington, which show so heavy a loss of sheep in Texas that the stock of that State diminished by over 40 per cent. in only four years—a far more serious retrogression than even that noted in the older European countries, and most certainly not a basis on which one would naturally found an apprehension of a serious competitive trade in mutton.

England has heard, however, suggestions that another of her own colonies may yet send home mutton as well as wool. And if the future has in store an extension, not only of material wealth and growing flocks, but of energy and enterprise in the large and, up to a recent date, rather neglected area of our South African territories, more may yet be heard of the proposal to start a frozen meat trade at the Cape of Good Hope. The plan has never, I believe, taken definite shape, but it was mooted some time back. The Cape alone, no doubt, contains over 11,000,000 sheep; Natal had, in 1885, half a million more; and there has been ascribed to our neighbour in these parts, the Orange Free State, a flock of over 5,000,000 merinos. There is here, at all events, some material to ship from, although scarcely of the quality which would be likely to meet much demand in London. The need of some sort of return freight for vessels trading to the Cape was counted on to give an impetus

some day or other to the project, which assumed as its basis a rate for shipments at $1d.$ to $1\frac{1}{4}d.$ per lb., were a beginning to be made by way of experiment with from 10,000 to 12,000 sheep annually.

It is hardly likely that such mutton as these regions produce would be welcome here. But, in the face of the story I have given of the growth and changes of the frozen trade in the last few years, it would be unwise in a general survey to overlook at least the possibility of seeing some day, if not now, a competition started in directions in which for the moment it is hardly possible to imagine the existence of a profitable trade.

X.—*Varieties of Wheat and Methods of Improving them.*

By HENRY EVERSLED.

THE oldest samples of English wheats are, I believe, those which Sir Joseph Banks collected early in the present century, and which are now under the charge of Mr. Carruthers in the botanical department of the Natural History Museum at South Kensington. In addition to a few foreign varieties the collection consists of wheat received from various parts of England, and especially from Kent, where Sir Joseph Banks had an active correspondent.¹ The foreign sorts of wheat were probably grown experimentally, and with regard to the rest several of them bear the names of existing varieties, which have since been cultivated, apparently without much change in some cases, while in others they have been modified by selection. Rivett or cone wheat is probably the same now as it was in the last century, and we may conclude from its vigorous and productive habit that it has not degenerated.

In writing an account of cultivated wheats, one would naturally desire to treat of their origin, to designate the leading sorts, and to describe the varied characteristics of the grain and straw, the hardiness, habit, and prolificacy of the plant, and the soils and particular condition of the soil that are most desir-

¹ The red wheats from Kent are Brown Wheat, Cobham Brown, Clarke's Wheat, White Straw Brown, Bland's Imperial Brown, Sicilian Wheat, Blue Chaffed Rivett without awns, and White Chaffed Rivett with awns. White wheats from Kent are Brown Strawed White, Eltham Hoary White, Hedge Wheat and New White; other sorts from other districts are Berwick White, Berwick Red, Essex White, Essex Red; and four other sorts from Essex. There are also samples of Taunton Dean, Italian, Hamburg, American Red, Duck's Bill from Oxfordshire, Windsor Wheat, Spring Wheat, and Pollard Wheat.

able for each sort. Nursery, for example, is a good sort to follow a sheep-fold; and—to mention another case in point—a large grower of Velvet Chaffed White remarked, “I never sow it after clover.” Those who did so, in the fen country, where this gentleman farmed, paid the penalty of their inexperience by the blighting of the crop. At the commencement of this short paper I wish to state that its object is solely practical. It will be devoted almost entirely to the varieties of wheat, to their behaviour under varying conditions of treatment and climate, and to their improvement, from an agricultural point of view, by various methods, and especially by cross-fertilisation.

The history of the leading wheats, their breed and parentage, and by what title they gained their prominence, would prove exceedingly instructive. Unfortunately, however, for that part of my subject, few of them can boast of a history extending more than a few years back, and sometimes the records do not run back ten years. I asked the origin of a wheat which its introducer believes to be by far the most productive wheat in the world, yielding more per acre and having heavier grain and taller straw than any other wheat on which the sun ever shone. It was discovered in a valley in the south-east of Europe, and was brought to England five years ago. This is a fair illustration of the origin of most of our best sorts.

But although the origin of our wheats is obscure, the most important part of their history—the value of the crop which each sort yields under given conditions—still remains to be discussed, and this is a part of my subject which has always excited keen interest at every market table, as well as in the pages of this Journal. The very first article, from the pen of Mr. Pusey, in its first volume, issued in 1839, commences with a statement on the importance of the wheat crop. This is a point which in passing may be at least alluded to for the sake of showing the importance of adding, however slightly, to the yield of the annual crop of wheat by the introduction of improved varieties. Mr. Pusey stated that the annual growth of wheat in England and Wales was estimated by Mr. MacCulloch at 12,350,000 qrs., worth, at 50s. per qr., nearly 31 million pounds sterling. The present annual growth in the United Kingdom does not exceed 9 million qrs.; but, as the crop is still held to be indispensable in the corn-growing districts, and still covers two million four hundred thousand acres, it is not surprising that at each recurring seed-time, in every market where seed-wheat is on sale, farmers are found eager to obtain the best and most productive varieties. It must be satisfactory to the members of our Society to be reminded that it has, times out of mind, lent itself to the

improvement of the leading cereal, either by the offer of prizes for the best sorts and samples, or by means of innumerable papers descriptive of the several varieties, of the methods which have been adopted for raising new sorts, and of the competitive trials by which their relative value has sometimes been tested.

In the first volume just referred to, the first hundred pages following Mr. Pusey's paper include an article by Mr. John Morton on the "Relative Values of several Varieties of Wheat," and another by Colonel Le Couteur—a prize essay—"On Pure and improved Varieties of Wheat lately introduced into England." Mr. Morton had made some trials on sixteen of the most commonly planted wheats—such as Old Red Lammas, Golden Drop, Hunter's Wheat, Thick-set Suffolk, White Taunton, Talavera, Red and Blue Cone—with a view of ascertaining their relative value, hardiness, and other qualities, and of effecting an improvement in the best of them. Commencing his experiment in November 1837, he planted the seeds at equal distances in adjoining plots, with the help of a dibbler invented for the occasion. Specimens, in the straw, of each of the varieties were laid before the Society, at its old address, 5 Cavendish Square, and the results of the experiment—showing the number of ears and the weight of the grain, straw, and roots produced by each sort, with other particulars—were carefully tabulated in the published article. The seed sown was partly selected from specimen ears and partly from samples, care being taken that the seed from each sort should be the best and plumpest that could be obtained. Not only the hardiness of the plants, but the spreading of the stems, technically called tillering, was noted with precision; and this, I think, shows Mr. Morton's appreciation of a characteristic which is sometimes somewhat inconveniently developed, for I have known a variety of wheat supplied by its "improver" at a high price per bushel, and sown thinly on that account, which tillered and tillered till the whole field was as green as a pasture, but the energies of the plants were so wholly given to tillering that they failed to produce a single seed stem.

Mr. Morton stated further that the following wheats proved the hardest: Thick-set Suffolk, Hickley's Prolific, Silver Drop, Hunter's, Golden Drop, and Blue Cone. The following were the most delicate: Egyptian Cone, Red Straw Lammas, Red Cone, and Talavera. The following took an average position in regard to hardiness: Old Red Lammas, Ten-rowed Prolific from Lincolnshire, White Taunton, Scotch White, and Hereford White. The property of tillering was possessed in the greatest degree by Red Straw Lammas, Red Cone, and Old Red Lammas; and in the least degree by Ten-rowed Prolific,

Egyptian Cone, Hunter's Wheat, Thick-set Suffolk, Hickley's Prolific, Blue Cone, Silver Drop, and Golden Drop. The most valuable crop, alike of grain and straw, was yielded by "a red wheat" from Cirencester; but Thick-set Suffolk was not far behind. Golden Drop was good in both respects, and Old Red Lammas nearly as good in grain, better in weight of straw. Hunter's did badly in grain and straw, and Talavera did only moderately; although in Surrey I have known it in some years excel all the corn on the farm, being early at harvest, very superior in quality, and productive, on sound land, in a good climate.

I may remark on this very interesting experiment, that although some of the leading characteristics of a variety may be ascertained even by a single trial, its suitability for particular soils and climates, and its behaviour under different kinds of culture, or in succession to the various crops of the farm—clover, folded turnips, mangold, or potatoes, with the varied tilths they leave behind them and the several degrees of fertility—can only be ascertained by a series of many such experiments as that which has just been recorded.

Among the varieties grown by Colonel Le Couteur, by far the most prolific was his own *Talavera*, introduced by him from Spain in 1830. In his work on wheat he described this famous sort as having been raised by him from a single grain, and as proving invaluable where it is adapted to the soil and climate. In trying this wheat against several others he sowed it on February 3, 1838, drilling 3 bushels per acre, and the crop ripened early and yielded 52 bushels per acre. In that season a Scotch farmer reported that *Talavera* from the Colonel's farm in Jersey was nearly ripe on September 12, and that he did not expect any return whatever from any other sort of wheat owing to the lateness of the season.

I am able to state that a selected strain of *Talavera* was for many years a favourite sort on the farm of a near relative in Surrey, in a district where only white wheat is grown, Chidham being a favourite. It was frequently sown in February; but that was in a soil and climate where wheat was commonly sown in the latest winter months. *Talavera* was not, with us in Surrey, more liable to disease than ordinary white wheats, and it yielded a fine, clear, white straw, suitable for plaiting. Colonel Le Couteur says that the chaff of *Talavera* adheres to the ear with such tenacity that more of it remains on the ear after thrashing than in any other variety. In M. Henry de Vilmorin's great work, *Les Meilleurs Blés*, *Talavera* is described as a wheat of super-fine quality both of straw and grain, as well as a free tiller,

but it has proved scarcely hardy enough to bear the cold of the neighbourhood of Paris. M. de Vilmorin speaks of a wheat which has been introduced into the valley of the Loire under the name of Australian wheat, which appears to be allied to Talavera. It should be borne in mind that several of the older wheats present a variety of forms. Talavera and Chidham, each alike, exist in several well-marked varieties, each of which probably owes its departure from the original type to changes induced by the environment of the plant. It does not appear that climate alone is sufficient to induce considerable and permanent changes, but climate and soil together may do so. It can easily be understood that some of the French and English wheats which have been introduced into Australia may have become naturally modified in their new home, and that some of those very numerous varieties of European wheat which are now sown in the United States may involuntarily produce new varieties even without artificial selection.

Another sort tried by Colonel Le Couteur was the *White Downy*, or Hoary—the “Velouté” of the French, believed to be the same as that described by Boys, in his *General View of the Agriculture of Kent*, as the “Hoary White,” or “Velvet Ear,” a sort said by that author to have been once much prized by the millers, but lost at the time of his writing. In the Jersey experiments it was second best, yielding 48 bushels per acre, and 2,402 lbs. of finest flour with 4,557 lbs. of straw, as against 2,485 lbs. and 5,480 lbs. in the case of Talavera. In all probability this is very similar, if not quite the same, as the variety described by that excellent authority Mr. Raynbird, of Basingstoke, as *Velvet-ear*, *Woolly-ear*, *Fluff*, or *Rough Chaff*. This is a favourite wheat in the south and east of England, where on fine wheat soils it produces good crops of semi-transparent white grain, yielding flour of the first quality. On rich loamy land it proves a reliable variety of wheat alike for quality and quantity of produce. France and the Channel Islands still come to England for the seed of this wheat. Among its sub-varieties are “Thick-set Rough Chaff,” with an ear resembling “Square Head” in shape, and with short stiff straw; “Long-ear Rough Chaff,” “Rough Chaff Talavera or Malaga,” a very early kind, and the “Golden Rough Chaff.” Mr. Robert Hewitt has successfully improved this wheat by selecting the best ears and growing no other sort on his farm. He reports it to be an early variety, which he has observed to be less liable to blight than other sorts.

Colonel Le Couteur thought that *Chidham*, a white wheat of high quality, grown on fine and favourable soils in Surrey and elsewhere, is identical with the sort called in Berkshire *Trump*,

in Essex Hardcastle, in some counties Old Suffolk, and in Scotland Hunter's White. About twenty years before the expression of that opinion Mr. William Trumper raised the sort called shortly *Trump*, taking the original ears from a field of wheat in the Thames Valley near Windsor. It certainly resembles Hunter's White, though it is not identical with it. Vilmorin describes it as a very productive wheat, with a handsome grain, plump and heavy, a sort not subject to disease, and preferring kindly soils a little calcareous. The straw is long, and it is rather liable to become laid. It ripens in good time, provided it is not sown too late in autumn. The quality of the grain is as good as its supposed alliance with Chidham would lead us to expect. Like Chidham, it is not widely distributed, though well known in the south of England.

Hunter's Wheat was discovered and propagated by Mr. Hunter of Linfield, near Dunbar, eighty years ago, and it shows its northern origin by its hardness. Of all the white wheats it is the least sensible to cold, and this character, together with its good yield and superior quality, has won for it high estimation in the colder parts of France. The grain is scarcely so long in shape as that of Trump, and may be recognised by the small or pointed ends. It has long straw like Trump, and its general characteristics would lead us to place it in the same group with that wheat and with Chidham.

Vilmorin says that many distinct varieties of wheat pass under the name of Chidham. The true *Chidham* is a productive wheat in kind soils in Surrey, Sussex, and Kent. The straw is rather below the average height, the ear is usually well filled with grain. Its quality is first-rate, and it keeps up its reputation in its own districts, where, as a rule, only white wheats are grown.

Hardcastle is another good old sort which has for a long period held its own. In the trials of seed wheat reported by Mr. Carruthers (Journal, 1881) Mr. James Long's selection of Hardcastle received a silver medal for superiority of produce, and Messrs. Carter received a similar honour for red wheat. Hardcastle has large ears, white and heavy grain, abundant straw, and great constitutional vigour, which secures its freedom from blight when other sorts suffer. It is not surprising that Mr. Charles Howard should have written, "I now grow nothing but Hardcastle, or Hardcastle and Browick mixed, which do well together. There is no better variety of wheat."

There is, however, no best sort of wheat for all soils alike, and in some neighbourhoods white wheat does not succeed,

while in others only the most healthful and vigorous wheats are capable of withstanding the special diseases which attack the crop. Mr. W. C. Little's Report on Wheat-Mildew (*Journal*, Vol. XIX. p. 634) is in this direction specially instructive. There is an old-established wheat, he tells us, which in the fen country is called the "Anti-Mildew" wheat.

Mildew is a prevalent disease in the fens, and no doubt every kind of wheat mildews there sometimes; but the hardy kind just named is supposed to have a greater power of resisting disease than any other sort. *Rivett*, or cone wheat, is also rarely attacked, as any one who, like myself, has farmed in Essex might expect: since in that county, where it was in high favour in the halcyon days for heavy land and corn-growing, it was often sown on land that was hardly in condition for a crop of the better sorts. On account of its stout, stiff straw and heavy beard it was called "large" wheat, all other sorts going by the name of "small," and high farmers were fond of sowing it as a second wheat crop after the other sorts. Tiptree was always well charged with manure, and at one period Mr. Mechi was fond of proclaiming his success in the growth of two crops of wheat in succession, "small" wheat the first year and "large" wheat to follow, the latter often yielding six or seven quarters per acre. The excellence of this advice was dependent on the superior constitutional vigour of *Rivett* wheat.

Mr. Little also mentions that *Talavera*, on the other hand, was regarded in the Fens as peculiarly susceptible to mildew, and that *Velvet Chaff*, *Rough Chaff*, or *Hoary White*, is believed to be a dangerous wheat, especially when it follows a clover ley.

Other sorts mentioned by Mr. Little as being most susceptible to mildew are *Scholey's Square Head*, *Golden Drop*, *Nursery*, and several sorts of white wheat; while *Rivett*, *Lenny's White*, *Browick*, and *Red Chaff White* were comparatively safe. Sir J. B. Lawes had observed Fen wheat suffering from mildew when his own was free from it, and he attributed this to the want of available mineral food in the soil. Under these circumstances it can readily be understood that ammoniacal manures might increase the evil. On the thin chalks both of Hampshire and Kent nitrate of soda, which is sometimes the only necessary manure on clays and greensand well stored with minerals, is avoided with full knowledge on the part of all experienced farmers that even small dressings of this manure increase the tendency to mildew. A plant improver can hardly be expected to produce a cereal

capable of withstanding cold, wet, poverty, starvation, and over-luxuriance; he cannot work miracles, but it is marvellous what he can do.

Spalding has been sometimes described as the best of all red wheats, which has repeatedly produced 8 qrs. per acre in Norfolk, Suffolk, Lincolnshire, and other counties. Its ears are large, the grain bold, and the straw tall, strong, and stiff. All we know of its origin is the story of its first appearance, when a farm-labourer named Spalding discovered it while wielding the flail in his master's barn at Barningham, Suffolk. Observing a few remarkably fine ears in a sheaf he had opened, he saved the seeds, planted them in his garden, and saved the produce for three years, when he sold his whole growth, and the first crop yielded more than 8 qrs. per acre. Spalding's work as an improver is similar in its character to that of many others, though the productive habit of the wheat certainly makes this a conspicuous example of what may be done by the selection of ears on which nature has set a favourable stamp.

The well-known *Browick Red Wheat* resembles Spalding, and has received improvement under the care of Mr. Banham and others. The good points of this wheat are its vigorous character and productive habit, and its tolerance of cold clays and gravels where few other sorts would thrive. It should be sown early, that is, in October.

Mr. Scholey's Square Head has become a very popular and widespread wheat. In fact it is a fashionable sort, of which it may be said that it was selected for its merits by a tenant-farmer, and has not been subjected to artificial treatment. Mr. Scholey found the parent ear of this variety in a garden wheat plot near Goole, Yorkshire, and propagated it. The crop of 1867 produced 81 bushels per acre, weighing 63 lbs. per bushel. Mr. Scholey tried his selected against other approved varieties for several years, and in 1873 he sowed against it the best seed of Kessingland Red, Rough Chaff White, Hunter's White, Golden Drop, Browick Red, and Mr. George Hope's Fenton, and it beat them all. As Browick was a very favourite sort, he had already tried it against Square Head every year for the previous five years, and his own sort had always proved the most productive, sometimes to the extent of more than ten bushels per acre.

Mr. Scholey had made repeated selections, always beginning with the produce of a superior ear. His wheat possesses a short club ear—the spikelets standing close together—and short stiff straw, and stands up well on rich well-farmed land, when most other kinds become laid. The ear is well filled, and develops both at top and bottom, where many varieties are deficient.

The straw varies in length from about 4 feet 3 inches to about 5 feet, according to the quality and condition of the land. Standing well, it retains its brightness and quality, and can be conveniently reaped by the self-binding harvesters. The Square Head has the merit of being approved by millers for the superior quality of the flour, and of ripening early. It should be cut when the straw is rather green. It may be safely cut when the ear and about two feet of the upper part of the stem have assumed a golden hue.

Improved Square Head Wheat will be found in all parts of the country where red wheat is grown. It has been mentioned to me as a leading sort by correspondents in many different counties, from the wheat-growing districts of Scotland to the south coast.

Burwell Red, which had its origin in a village in Cambridgeshire, is similar to Red Lammas, Clover Red, and Old Kent Red, and deserves to be ranked as a first-class variety. It is particularly in favour on some of the chalk and oolite hills, where it enjoys the reputation of being hardy and prolific, and of producing an abundant crop of long straw and a superior sample. An informant states that at Burwell, in thrashing the grain with the flail, it was a general practice to open the sheaves and search for the best ears for the purpose of obtaining stock seed.

Among many other well-known sorts, *Nursery* ranks as the best of the red wheats for the superior quality and weight of the grain. No English wheat stands higher with millers. It is esteemed as the best variety for sowing after a root crop, and for sowing in the later months of winter, in January and February, in those districts where such late sowing is resorted to.

There are numerous wheats bearing different names which are merely synonyms; and many other kinds which have been distinguished by separate names exhibit a very close family resemblance. Vilmorin's *Catalogue Synonymique des Blés* will contain, when issued, a very complete list of these synonyms and close resemblances; and *Les Meilleurs Blés* has also much information on the same subject. An extended list of synonyms would fill many pages, and would only be suitable in an elaborate memoir on wheat. I am, however, enabled by the kindness of M. H. L. de Vilmorin to introduce here a few characteristic examples, which will perhaps suffice.

Taunton Dean is an old and noted wheat, and the best of several varieties which closely resemble a popular wheat of France and Flanders, described in *Les Meilleurs Blés* as *Blé Blanc de Flandre*. It has white straw, straight, strong, and sufficiently tall, an ear almost square—that is, of equal breadth

whether looked at in face or profile—slenderer towards the top than at the more compact base, with a long grain, full and stout, very white and thinned off at the ends. The same marked characteristics appear in seven or eight French wheats, and in our own *Hopetoun*, *Pearl White*, *Silver Drop*, and *White Kent*. *White Hunter* and *Trump* belong to the same section, as well as Mr. Shirreff's *Mungoswell Wheat*, derived from a plant which he selected in one of his fields in 1813 for its vigorous appearance, Hopetoun being a similar selection of Shirreff's from an adjoining farm.

White Victoria is another very important wheat, classed by Vilmorin in the same section as the above. It bears a close resemblance to *Red Chaffed Dantzic*, and was probably imported from Dantzic into this country. Its popularity is proved by its numerous synonyms, and by the fact that several seed-merchants have adopted it, each of them bestowing upon it a name of his own choice. According to Vilmorin, Lawson called it in 1858 *White Swan*, others have named it *Prince Albert*, *Prince Albert White*, *Oxford Prize White*, *Normandy White*, *Champion Prize White*, *Challenge*, *Mold's Ennobled White*, *Hereford Wheat*, *Jersey Dantzic*, and so on. In the International Exhibition of 1851 it appeared as *Australian White Wheat*.

The next example is a coarse strong wheat, of totally different character from the last, bearing as its chief English name that of *Kessingland*. It was also named by Mr. Rham, in 1836, *Essex Red Wheat*; by Mr. Hallett, *Hallett's Pedigree Nursery*; and it appears in Lawson's list, in 1857, as *Woodley's Superb*, and elsewhere as *Haigh's Prolific*. In France its principal name, among at least a dozen, is *Victoria d'Automne*. It has tall, stout, and very hollow straw, furnished with numerous large leaves, a big ear flat and broad, glumes fantailed, often bent, rarely white, almost always salmon-coloured or tawny. The grain is reddish yellow, large, oblong in shape, and full. This variety is largely grown in England, and is well suited to rich, sound, and well cultivated soils, and climates that are exempt from severe frosts or excessive heat. Few sorts of wheat yield heavier crops of straw and grain, provided the land is well farmed. It should be sown in good time in autumn. It commences its growth more promptly in spring than many kinds of wheat, and even before the appearance of the ear it can be recognised by the length and large size of the leaves.

Mr. Shirreff's *Square Headed Wheat* is the representative of an important group largely grown in England, Scotland, and the Continent. The wheats of this class have white straw, short, very stiff and upright. The ear is square and compact,

and furnished with short straight awns at the point. The grain is yellow or reddish, middle-sized and full. A leading characteristic of Shirreff's Square Headed Wheat is its hardiness. It rarely suffers from the prolonged cold or the frosts of spring, an exemption which is no doubt partly due to its slowness in commencing growth at that season. The short, stout straw is well able to support the stout ears of this variety, and there is probably no other kind of wheat which is so little liable to become laid. Its qualities specially adapt it for resisting the evil effects of a humid climate, and its popularity in this and some other countries, especially in clay soils, is not therefore surprising. In such a variety a number of synonyms might naturally be looked for, and accordingly we find among several other French and English wheats closely resembling it Scholey's Selected Square Head, Webb's Selected Square Head, and Clover Red Winter Wheat.

The wheat called *Thickset*, from its close and compact ear, is classed in Vilmorin's *Catalogue Synonymique des Blés* in the same section as the above. There are several synonyms in French and English, and the name of Mr. Samuel Hickling, of Carston, Norfolk, seems to have been placed at the head of the list, in consequence of his having discovered or selected this wheat in 1830. It does not yield well in cold or tenacious clays, and, although it was held at one time in high favour in Norfolk, it has for some time past been supplanted by Square Headed Wheat. A defect in *Thickset* Wheat is that the spikelets at the top of the ear break off easily in thrashing, and cannot readily be separated from the sample.

White Wheat of Hungary, having a compact ear, white grain, and very stiff straw, is similar to Lawson's and Le Couteur's *Archer's Prolific* and *Club*, which has been introduced into France, and is now largely cultivated in the light calcareous plains of the central part of that country, where the climate is dry. It is not liable to rust nor to become laid; but in strong soils it does not find the conditions that suit it. The same wheat appears in the catalogue of an English seed-merchant as *Selected Hardcastle*; and a closely allied and excellent prolific sort, called *Roseau* in France, was exhibited by Mr. Webb at the Great Exhibition of 1851 under the name of *Free Trade Wheat*; while another family connection is known across the Atlantic as *Canadian Winter Flint Wheat*. Another sub-variety of the same wheat, with a larger ear, is described in various lists and catalogues as *Big Club Wheat* (of Oregon), *Little Club*, *White Club*, *Oregon Wheat*, *Ostend Wheat*, *Chili Wheat*, and *Thibet Wheat*.

In another section we have *Prince Albert Wheat*, or *Albert's Red*, *Oxford Red*, *Clover Wheat*, *Northampton*, *Huntley's Prolific*, *Red Talavera*, *Chancellor's Red*, and so on. The typical characteristics of this family are stout, tall straw, very leafy and stiff, grain red or yellowish red, rarely very plump. The cap is long, and the sets of grains are large and fantail-shaped. It is a wheat suited to rich deep land, productive of grain, and still more so of straw.

The last variety to be noticed here is *Scotch Red* or *Blood Red*, called also *Golden Drop* and *Prolific Red*, and honoured by several seed-merchants with their own names as a prefix. The straw is of moderate length, strong and flexible, and often violet-coloured below the ear. The ear is red-brown, of a fair length, slightly flattened, and, to mention one of those slight characteristics by which different varieties can be detected, the awns of the glumes are short and turned inward. The grain is full and heavy, red or reddish yellow, or divided into two equal parts, one red, the other yellow. The cultivation of this excellent variety seems to have originated in East Lothian; but *Golden Drop* is now widely grown throughout the whole country, being hardy, of good quality, and not liable to become laid.

In treating of the principles of wheat improvement and the methods of obtaining new varieties, I feel bound to describe Major Hallett's system of enlarging the ear and grain by thin seeding. In a paper "On Pedigree in Wheat as a Means of Increasing the Crop" (*Journal*, 1861, p. 371), Mr. Hallett lays down the following axiom: "*Of the grains in the same ear one is found greatly to excel all the others in vital power.*" Considering the slow steps by which the wheat plant has usually either "progressed," from the cultivator's point of view, or suffered retrogression, it seems a somewhat startling proposition that one grain in an ear should in any respect "greatly excel" all the others. Mr. Hallett states that in 1857 the original ear which he sowed for the sake of discovering its best grain, which he purposed making the parent of a pedigree breed of wheat, measured $4\frac{3}{8}$ inches long, and contained 47 grains. The following year the best ear of all those produced by the 47 grains measured $6\frac{1}{4}$ inches long. It contained 79 grains, and the best plant that year yielded 10 ears.

It seems to me most important that wheat-growers should clearly understand whether there is a system of plant-improvement which admits of the doubling of their crop within a few years, or whether, on the other hand, Mr. Hallett and others—the propagators of enlarged ears—are misled as to the real value of the structural enlargements they rely upon. I propose, there-

fore, to relate the history of the successive enlargements of the pedigree wheat during three more years. In 1859 the finest ear measured $7\frac{3}{4}$ inches, and contained 91 grains, and the "finest stool" yielded 22 ears. The year 1860 was wet, and we are only told that the "finest stool" yielded 39 ears. But in 1861 Mr. Hallett tells us that the finest ear measured $8\frac{3}{4}$ inches and contained 123 grains, while the finest stool yielded 52 ears. "Thus," the experimenter adds, "by means of repeated selection alone, the length of the ears has been doubled, their contents nearly doubled, and the 'tillering' power of the seed increased three-fold."

This is certainly very rapid progress, and as we are told that the enlargement of the ears did not have the usual effect of reducing the number of stems, the crop of 1861, allowing for the enlargement of the grains, ought to have been increased three-fold as compared with that of 1857. In point of fact, it was increased from between 32 and 36 bushels per acre—the customary yield—to 54 bushels per acre.

It is a curious circumstance that the original ear of the pedigree wheat appears to have been Kessingland instead of Nursery, as the originator had intended. Several growers who can never have heard of M. de Vilmorin's *Les Meilleurs Blés* have pointed out the exact resemblance of the pedigree wheat to the coarse sort just named; while we read, in confirmation of their opinion, in the above-named work of authority: "Hallett's wheat has all the characteristics of Kessingland and none of those of Nursery."

I think it will generally be admitted as a sound principle in the improvement of wheat that the plant should be subjected to ordinary conditions, and that the enlargement of the ear by leaps and bounds must have been due to thin seeding. Mr. Hallett planted his grains "twelve inches apart every way." I shall not follow him in his elaborate account of the practice and advantages of thin seeding, of the 934,000 ears per acre produced on one side of a hedge from 6 pecks of seed, while on the other side $4\frac{1}{2}$ pints per acre produced more than a million ears. If anything can be regarded as having been satisfactorily proved and settled in agriculture it is the fallacy of excessively thin seeding. This, however, is not my subject, and I only refer to it because Mr. Hallett claims to have imparted to his wheat an increased vitality by that method. "The vital powers of the different grains of ordinary wheat are," he says, "very unequal. But by repeated selection, commencing annually with a single grain, the vital power becomes equalised in a very remarkable degree." Each grain, he asserts, gains immensely in constitutional vigour, the

tillering powers of the plant are enormously increased, and the ears become enlarged and more uniform in size. Even so long ago as 1860, when the pedigree was short, Mr. Hallett claimed a crop on 698 square feet, at the rate of 108 bushels per acre; and, if no flaw existed in his theory, there seems no reason why twice as large a crop might not have been long since attained.

Writing in 1861, Mr. Hallett was unaware that his giant ears had already reached their maximum; but a letter from him to the *Agricultural Gazette* of November 29, 1886, seems to admit that the ear of 1861 had never been excelled, and that his best record was still 123 grains in a single ear. I write without the least desire to depreciate the value of Mr. Hallett's experiments, but it seems to me that my account of the different varieties of wheat should include the enlarged wheats, though none of them are really new varieties, but only bloated specimens of old ones. Thin seeding, which gives the wheat plants more space both above and below ground, is in fact a method of securing high-feeding, and on this point Dr. Maxwell T. Masters, F.R.S., the editor of the *Gardener's Chronicle*, has been good enough to give me his opinion as follows: "Starving or feeding would develop luxuriance or the reverse; it would not occasion any structural change in kind, but only in degree." The Rothamsted experiments on pastures may be cited in confirmation of this remark.

Any kind of wheat can be made relatively gigantic by thin seeding in good land; but the result is not a new variety, it is not even permanently altered, though it is certainly spoiled for a time. It is significant that none of these enlarged forms have found favour in the great corn countries. A recent report of the United States Department of Agriculture gave a list of all the varieties grown in the States, enumerating 270 sorts. Among these any variety with a pedigree of four years, and an ear enlarged by thin seeding and capable of producing from 54 to 108 bushels per acre, might be expected to occupy the leading position among a shrewd race of farmers whose average of 12 or 14 bushels per acre has brought them for some years past little or no profit. But the variety having the widest distribution is Fultz, a red winter wheat, which originated in Pennsylvania, and was distributed in 1871 and since by the Department. It is named after the farmer who first cultivated it, and it probably occupies one-third of the area seeded in winter wheat, producing at least a fourth of all the wheat harvested in the country. A variety called Mediterranean comes next in importance, and then the Fyfe wheat—named after its Scotch introducer. A winter wheat named Clawson ranks next, and these

four varieties appear to be of more practical importance than all the others.

No one can doubt that each and all of the characteristics in wheat which are held to be desirable are capable of being developed. Several improvers at the present time are making persistent efforts to produce and fix the various characteristics of finer grain, better straw, earlier maturity, a more prolific habit, and so forth; but none of them anticipate rapid development in any of the modifications they are endeavouring to establish.

It must not be forgotten that a carefully protected and cultivated crop like wheat—as well as other plants producing seed—exerts a power of self-selection of the “best” grains, since the most productive ears and grains in every wheatfield must always produce the most seed. Every bushel of wheat-seed, therefore, must contain the largest proportion of the most productive seeds.

As to the result of abnormal enlargements, I saw last year some giant wheat growing side by side with Hardcastle on sound, dry land in Somersetshire. It was evident before harvest that the Hardcastle had borne the cold, wet season far better than its big-eared neighbour, the straw proving more healthy and upstanding. I afterwards saw the two crops in stacks, and I need only say further that the Hardcastle had produced a good sample which was largely sold for seed, while the big-eared sort yielded a wretched sample of immature grain.

I may mention here an illustrated article on the spring-sown wheats of 1873 (*Journal*, 1874), in which Mr. J. C. Morton gives fifty pages of reports from wheat-growers. It is an article containing much useful material, and full of information on the characteristics of varieties. I refer to it for the sake of its emphatic condemnation of giant wheat, and of the thin seeding which causes wheat to become gigantic. One of Mr. Morton's correspondents sowed some giant wheat at the rate of four or five pecks per acre on October 1—an early period for the district. He reports, “It tillered wonderfully; the ears were of great length, and the straw three to four inches longer; but the straw was speckled and unhealthy, and when thrashed, although there was a much greater bulk of straw, it yielded considerably less than that put in in November, at the rate of five pecks per acre.” It seems unnecessary to offer further evidence of this sort, and I will therefore pass to a more agreeable part of my task.

It has often been asked, “What is the origin of the new varieties of wheat?” This is a difficult question. One need

not hesitate to suppose that some of the old varieties of the last century collected by Sir Joseph Banks are still represented by modern offspring of approved merit, which in some cases may exist under changed names. It is impossible to say how long a new variety may have been in existence before its discovery; it may have sprung into being like Minerva from the head of Jupiter, or it may have been evolved by the slow processes of change, or it may have been the result of cross-breeding. All these methods by which new varieties are formed take place in nature. Who can tell what is going on among the millions of plants in a wheat-field?

Dr. Maxwell T. Masters has been good enough to inform me as to the exact meaning of the term "sport," referring to a phenomenon which sometimes occasions the sudden appearance of a new variety. He states that "a sport is usually understood to be a leaf-bud or shoot appearing suddenly in one particular part of the plant, and differing in character from its other buds and shoots." The production of side buds (secondary axes), usually called tillering, yields a number of ears of similar character. When, however, one of the ears differs from the rest—if this ever happens—it is a sport. Sometimes the offspring of a sport exhibit the same altered character as the parent ear, and the character proves permanent. This may be one source of new varieties, but M. de Vilmorin informs me that no sports have ever appeared in his wheat plots, and there have been only two cases of natural cross-fertilisation. The term "sport" is sometimes loosely extended to seedling variations.

Selection without cross-fertilisation is another method. I am not quite sure that any breed of animals can be named whose improvement has been accomplished without the introduction of fresh blood. It usually happens that the desired qualities can be introduced more rapidly by crossing followed by selection than by selection only. The same physiological law of modification applies to plants as to animals, and I am pleased to say that an improver both of wheat and sheep, who has greatly modified the latter without cross-breeding, is at the present time applying the same method to the improvement of wheat. The gentleman I refer to, Mr. Alfred de Mornay, of Col d'Arbres, Wallingford—famous for the early maturity of his Hampshire sheep—has been good enough to send me the following report. He says:—

I am trying to carry out a system for the improvement of cereals on the lines I have followed with sheep, and I think with some success; but before a positive conclusion can be arrived at from any attempts of the kind in a climate so uncertain as this, more time is required than I have as yet

devoted to the subject. My experiments, moreover, have been made in a rough and ready way on the crops of the farm in the ordinary course of husbandry. The seed used has been the ordinary quantity of two bushels per acre.

I agree with you that wheats merely enlarged in the ear and grain by thin seeding are constitutionally weak. I think wheat so treated does not transmit the vigour which the development thus obtained would indicate. My firm opinion is that in order to establish in seed a property which is to affect succeeding crops it must have been acquired by treatment for a series of years directed to that end. The plan I have gone upon has been as follows:— Having determined the chief characteristics desirable for development, I procured in the first instance those wheats which most nearly approached in character the conditions I had laid down. After repeated trials I ascertained which kinds were the most suitable to the soil. Then by yearly selection from the produce of these and supplying the elements essential to a healthy growth, I have, I think, in an appreciable degree induced a habit to transmit their acquired characters in succession through the action of progressive development.

I send you a Table showing the results and observations made by me for nine successive years, which will give you some indication of what has been achieved so far, and you will see, I think, that there has been a decided, though intermittent, improvement in both yield and quality.

Table showing the Yield per Acre of Two Varieties of Wheat from 1880 to 1888 inclusive.

Year	Anti- podes	Col d'Arbres	Remarks
	Per acre qrs. bus.	Per acre qrs. bus.	
1880	3 2·1	—	First year of introduction. Straw short; small ear; grain plump
1880	—	4 0	An earlier introduction. Straw and ear medium; grain plump and white
1881	3 2	—	No change from last year perceptible
1881	—	3 7·2	Grain not so plump; no change in straw
1882	3 5·1	—	Straw longer; no change in grain
1882	—	3 6	Straw not altered; Grain improved in colour
1883	4 0	—	Both straw and grain improved
1883	—	4 3·5	Straw longer and stronger; Grain improved in colour
1884	3 7	—	Straw very strong and grain good
1884	—	4 4	Straw strong and bright. Grain improved in colour and size
1885	3 6·3	—	Straw and grain very good
1885	—	4 1·1	Straw bright and grain good
1886	4 0·4	—	Straw strong and bright and grain very good. <i>1st Prize, Abingdon Show</i>
1886	—	5 2	Straw very bright and grain excellent. <i>1st Prize, Royal Counties Show</i>
1887	4 5·7	—	Straw shorter but very bright; grain very fine
1887	—	5 1·3	Straw like silver but short; grain exceptionally fine
1888	4 7·5	—	Straw longer but not so bright as year before; grain good
1888	—	5 2·1	Straw longer: not so bright as year before, but strong; grain good. <i>1st Prize Abingdon Show</i>

If the Table had closed with the year 1887, which was an exceptionally good year for wheat, it might have been con-

cluded that no material progress has been made, but the year 1888 was an exceptionally bad year, and the satisfactory character of the crop in that year is exceedingly encouraging. Mr. de Mornay's progress is slow, but it is genuine.

It appears from what has been stated that new varieties of wheat usually owe their introduction to accident. A remarkable plant is found in a hedge, or elsewhere; its discoverer propagates it, and it proves to be a distinct variety, or at least a new strain. It is rare for an improver to proceed on the lines adopted by Mr. de Mornay, who selects year after year characteristics which he regards as desirable, and which he hopes will at length be found sufficiently impressed upon the plant to become hereditary.

In a former article, "Improvement of the Plants of the Farm" (Journal, 1884), I mentioned various experiments in cross-fertilisation. Mr. Hugh Raynbird introduced and wrote an account of a cross-bred wheat which obtained the gold medal of the Highland Society in 1848 and a prize medal at the Great Exhibition of 1851. At the same Exhibition Mr. B. Maund, a skilful botanist, while Mr. Raynbird was and is a skilful agriculturist and seed merchant, also showed a collection of cross-bred wheat. Mr. Maund unfortunately used, as one of the parents, cone wheat of a productive but coarse variety, not well suited to the object in view. Mr. Raynbird impregnated Piper's Thickset with pollen of the Hopetown, the former being a coarse red wheat, with thick clustered ear and stiff straw, very productive but apt to mildew, the latter having long ears and straw, and white grain of fine quality. The two varieties were a perfect contrast, and in that respect Mr. Raynbird proceeded on the same lines as Messrs. Carter have done more recently.

As the result of the impregnation Mr. Raynbird obtained a few shrivelled grains, which he sowed early in the autumn, increasing the number of plants by division of the roots. The produce consisted of many kinds both of red and white wheat, some of the ears bearing a perfect resemblance to Piper's Thickset, while others partook of the character of the Hopetown in everything except in the colour of the chaff; others had half the ear thin and open and the remainder close set, so that the characteristics of each kind were apparent in the same ear. Mr. Raynbird stated in his pamphlet on the new variety (1851) that its cultivation had been continued, and he added, "by careful hand-picking an even sample is now obtained." Amid the pressing engagements of the originator the wheat was afterwards lost.

In a lecture delivered before the Society of Arts Mr. John
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Wilson, then Principal of the Royal Agricultural College at Cirencester, mentioned, in referring to Messrs. Raynbird and Maund's experiments, the advantages to plants and animals of a process of crossing. He added, on the authority of Gärtner, "that this process in reference to the cerealia can hardly be said to have had any existence." That this is still true is proved by the absence of any paper on the subject of the cross-breeding of the cereals in this Journal.

Shirreff's crossing of wheat, and some other experiments in foreign countries noticed in my former article, need not be again referred to, and we may now at once pass to those much more promising experiments which are still in progress near home. The earliest of these undertakings was that of M. Henry L. de Vilmorin, to whom I am greatly indebted for the following account:—

The flower of wheat, as is well known, contains three stamens and one pistil, which latter ends in two feathery branches. The impregnation, as a rule, takes place in the closed flower, before the stamens are pushed out. Indeed, when the flower slightly opens to let the stamens come out and hang on the side of the ear the work of fertilisation is already accomplished. The consequence of this is that the wheat seed is almost invariably the offspring of only one flower, self-secundated, and that there is scarcely any reason why a wheat seed should not reproduce faithfully all the characteristics of the parent plant, which it directly inherits as well on the male as on the female side. This accounts for the fact that varieties of wheat are generally reproduced very truly from seed.

Again, there is no reason why the hand of man should not accomplish what nature of itself generally leaves undone—I mean the cross-fertilisation of wheat flowers. Few are the plants that can be more easily managed in this respect. Any moderately skilful hand can open the wheat flower, extract with fine nippers the three stamens while still in a green state, and close the flower again by encircling it with some tie so as to prevent the possibility of foreign pollen finding its way down to the pistil. If on the next day pollen from another wheat flower be brought in contact with the pistil—which is easily effected by opening the flower and pouring in the pollen from a ripe stamen—the cross-fertilisation is insured so effectually that not one operation out of ten proves unsuccessful.

The object of such cross-fertilisation may be two-fold. First, an enhanced vigour may be expected, as there is every reason to believe that the advantage of cross-fertilised as against self-fertilised seeds, which is the rule in other natural orders, should hold good in graminaceous plants. Secondly, the possibility may be contemplated of raising new varieties endowed with some special qualities which should make them particularly fitted to answer certain requirements either for agricultural or milling purposes.

Selection alone, as practised amongst the seedlings from self-fertilised seeds, affords a pretty sure, but generally slow, means to work any change that may be desired in a given variety. But while a wheat, for instance, is under this process made earlier or more prolific or more disease-resisting, its special characteristics are little, if at all, altered. Now it may be desirable, for some special purpose, to preserve some features in a plant and to discard some other. This is scarcely to be hoped from selection *pur et simple*, whereas this end may be attained rapidly by sowing cross-bred

seeds. It is well known that, in the offspring of cross-fertilised seeds, some of the characteristics which are blended in the progenitors are often dissociated so that one of the seedlings may inherit the shape of its parent but not its colour, or *vice versâ*. Although it is not known how such combinations of qualities are brought about or dissolved, it is an ascertained fact that seedlings show strange changes in this respect, and it becomes apparent why cross-fertilisation gives the fairest prospect of amalgamating distinct but not repugnant qualities which it may be the object of the grower to unite in a new variety.

Such was the train of thought which led me to the first attempts to raise cross-bred wheats. My first distinct object was to derive from a then very popular variety known as "*Chidham d'automne à épi rouge*" some new form of wheat equally prolific and not inferior in milling qualities, but yielding a larger proportion of straw, the original *Chidham* being esteemed a perfect wheat except in the shortness of its straw. In order to obtain that end, I crossed the *Chidham* with the red-eared *Prince Albert* wheat, which is one of the tallest and most strongly-growing of all known kinds. Amongst the ten or twelve plants developed from the original cross one was selected as answering pretty exactly the object in view. All the seed from this one plant was sown the next year, only one ear being kept as a type to guard against variation in the offspring. But none took place. The new form showed itself at once to be a perfectly fixed variety. In three or four years a few hundredweights were raised, and the new wheat was introduced to the public as "*Dattel*." It rapidly gained favour, and is now one of the white wheats most generally grown in the central districts of France.

In appearance *Dattel* wheat is very much like "*Chidham d'automne à épi rouge*," one of its progenitors. It is a red-chaff white wheat, only it is different in the lighter colour of the ear and in the more pointed chaff. The seed is more elongated, not so plump apparently, but in fact larger and heavier than in *Chidham*. Like the latter, *Dattel* tillers very freely. I raised plants with more than sixty haulms from one seed. The straw is white, strong, erect, and fully six inches taller than that of *Chidham*, which was precisely the object I had in view.

"*Lamed*" wheat was raised in a similar manner from "*Prince Albert*" and "*Blé de l'île de Noé*." It is earlier in ripening than *Dattel*, with a slightly taller straw, a peculiar bluish-brown colour about the ear, and a large light red or amber kernel. It is not as well fixed as *Dattel*, and, in spite of all the care in "*roguing*" and selecting, a few plants with white chaff turn up at every generation. This is accounted for by the fact that one of the progenitors is a white-eared wheat.

"*Aleph*," a cross between "*Noé*" and "*Blé blanc de Flandre*," was discarded within two years of its being introduced to the public. Although it yielded one of the finest samples of white wheat I ever saw, it proved too late in ripening, and not sufficiently disease-resisting.

Out of hundreds of cross-bred seedlings that were raised at *Verrières* only those three, presently reduced to two, were ever distributed, because I wish to connect my name as a raiser of new wheats only with really first-rate varieties. But I have under cultivation at the present time other kinds which may, I trust, stand as high as *Dattel* or *Lamed* in the estimation of the farming world.

From the above you see plainly that it is a simple and easy thing to start variation and to give rise to new forms of wheat. The really difficult and somewhat tedious part of the task consists in discriminating which forms are worth preserving, and principally in fixing them by long-continued selection so as to turn new seedlings into permanent races.

The only addition I shall venture to make to the foregoing account is that several of the cross-bred wheats originated by means thus clearly described are now widespread in France, where for several years past they have been held in high esteem.

Messrs. Carter's experiments in the cross-fertilisation of wheat commenced in 1883, when twenty-two crosses were effected between sorts of wheat which had been previously collected and sown for that purpose in the autumn of 1882. The experiments were partly suggested by the offer of prizes by the Royal Agricultural Society for the best new varieties of wheat, and partly by personal observation of the disastrous consequences of late harvests in Scotland, where wheat frequently remains in the field till the end of October or even in November, the varieties in cultivation ripening too late for the climate.

The plan laid down at the outset was the use of good parent sorts and the crossing of varieties as wide apart as possible in appearance and character. The objects to be attained were early maturity, productiveness, hardiness, and high quality both of grain and straw. Another object kept in view was the crossing of red and white wheat, so as to obtain in one grain the colour of white wheat with the strength and body of red. Among the earliest results may be mentioned that in 1884 the twenty-two cross-bred wheats produced an average of twenty-two ears per plant, and that in 1885 each ear, taking a full ear of each cross, produced an average of sixty-five grains.

It is important to notice that ordinary cultivation was resorted to, as opposed to thin seeding and the production of giant ears. The experiments were carried out at Messrs. Carter's Forest Hill Nurseries, and as these are near my house I have enjoyed at all times and seasons the frequent opportunity of inspecting the trial plots. I must be content to offer a very brief summary of these experiments, showing the varieties of some of the wheats that have been used as parents, and the peculiarities of the offspring.

In crossing red and white wheat together a white sort called Fill-measure, with smooth chaff and square ears, was crossed with Selected Red Square Head wheat as the male parent. The offspring has longer straw than either parent, and longer ears than the male, which has, however, clearly influenced the cross-bred offspring in the shape of the ear and the colour of the grain. This same successful cross turns out to be satisfactory in regard to quality, as well as being one of the earliest wheats next to the Talavera group.

Another cross between Royal Prize Red and another long-eared variety exhibits a curious freak, since the long, square, thick-set ears are distinct from those of either parent. In another cross between the same red wheat and a long-eared white wheat, as male, the influence of the latter has been most potent in the colour of the grain; while, curiously enough, the offspring ripens a fortnight earlier than either parent.

A cross between a woolly-chaffed white wheat and a smooth-chaffed club-headed red for male, proves exceedingly productive and vigorous, one plant having yielded sixty ears, and a field crop having produced at the rate of fifty-four bushels per acre. The colour of the grain shows the influence of each parent alike.

In another case square-headed white, female, and long-eared white, male, have produced a wheat which proves to be the last sort to thrust its ear from the sheath of the stem, while, next to Talavera, it is one of the earliest to mature. Except that the ear is closely packed, it favours most the male parent, having an ear and grain of the same colour and the same length of straw.

A cross was effected between Talavera and Royal Prize Red for the purpose of obtaining the early habit and superb quality of the former, combined with the vigorous constitution of the latter. The result proves a decided success, the offspring of the cross, or rather the latest selection from it, possessing the desired qualities.

The selection from a cross between a bearded April wheat and an American bearded variety proves earlier than either parent, with grain quite equal to that of the well-known Russian Kubanka. This, of course, is a spring wheat, and the habit derived from its parents must be kept up by constant sowing in spring.¹

One of the most singular results of crossing is found in a sort which has received the characteristic name of Birdproof. The female parent was Fill-measure, the male an American bearded wheat, and the cross exhibits sharp-pointed awns on some of the glumes at the apex of the ear, a defence which birds have shown themselves shy of approaching.

Many other crosses have been effected, and the offspring are now under selection, but the foregoing account of some of the most immediate and characteristic results of crossing distinct varieties will perhaps suffice.

It may, however, be mentioned that length of straw is generally influenced by the male parent, and form and size of ear by the female. The prostrate or, as they are commonly called, the creeping forms of wheat usually bear ears more or less drooping.

Like other experimenters, Messrs. Carter have found that cross-bred seedlings usually produce a variety of forms, and that careful selection is required to fix in a permanent form the most desirable types. The result of crossing a *woolly chaffed* wheat and a smooth chaffed wheat has been the production of 75 per cent. of ears with smooth chaff, and 25 per cent. with rough or woolly chaff ears. Again, the parents of one of the crosses being a red wheat and a white wheat, the 1887 crop of this cross produced some ears with woolly chaff, and, but for the care exercised

¹ Perhaps I may venture to commend this sort to certain districts in the Far West, where only the quick wheats can escape the spring and autumn frosts and mature within the very short limits of the allotted season. The cross has been grown side by side with some Russian wheats grown in Canada on official recommendation, and sent to Messrs. Carter by Professor Saunders, and has greatly excelled them in the amount of produce as in other respects.—H. E.

in the sowing of the grain so as to render an accident in the sowing of a grain from another crossing practically impossible, the natural assumption would have been that such an accident had occurred, and the experimentists themselves would have entertained some doubt if the woolly chaffed offspring had not exhibited unmistakable traces of their actual origin. It was found, however, that whereas the chaff in this selection was what is familiarly known as of woolly or velvet texture, the straw when ripe had the peculiar purple colour of the female parent; and so far as Messrs. Carter's observations have extended in the cultivation every year of something like a hundred and fifty varieties of wheat already in commerce, they have failed to find any variety possessing the peculiarities shown in the cross.

Messrs. Carter's is the first systematic, and I might say determined, attempt in this country to improve the varieties of wheat by cross-fertilisation, their manager residing upon the spot. The following Table gives the results of some minute observations of the progress of the wheats grown upon a strong loam with yellow clay subsoil 16 inches from the surface:—

Statistics showing the period at which twelve selections of Cross-bred Wheats made their growth in 1888, together with comparative Tables giving the dates when "in ear" and when "ripe" in 1887 and 1888.

Cross-bred wheats	Height of wheat plants, May 15, 1888	Growth of wheat plants, May 15, 1888, to May 31, 1888	Growth of wheat plants, June 1, 1888, to June 30, 1888	Growth of wheat plants, July 1 to July 13, 1888, when regular measurement ceased	Final height of wheat plants	Date when in ear, 1888	Date when ripe, 1888	Date when in ear, 1887	Date when ripe, 1887
No.	inches	inches	inches	inches	inches				
3	16	10	24	3	57	June 25	Sep. 1	June 23	Aug. 10
4	20	12	18	6	57	" 25	" 1	" 22	" 10
7	15	6	18	8	54	" 25	" 6	" 22	" 10
9	15	8	20	5	54	" 25	" 6	" 20	" 8
10	14	14	16	11	56	" 30	" 1	" 28	July 30
13	15	15	24	—	54	" 16	Aug. 20	" 16	" 28
15	16	16	24	1	57	" 25	Sep. 1	" 22	Aug. 10
16	17	11	29	—	57	" 25	" 1	" 24	" 10
19	14	18	19	3	55	" 26	" 1	" 23	" 6
21	13	15	22	2	52	" 26	" 1	" 27	" 10
22	16	13	18	—	47	" 30	" 10	" 28	" 6
31	14	18	21	2	57	" 25	" 10	" 20	" 10

From the above Table it will be observed that the coming into ear period in 1887 and 1888 did not show a marked dif-

ference, whilst the ripening in 1888 was from three to four weeks later in 1888 than in 1887. The comparative growth of the wheats in different periods of the summer and the height of the straw of each and dates of coming into ear are all observations of importance; but the dates when the corn of each plot was ripe are of special significance. On this important point it may be observed that the harvest of 1887 was not an early one, and that July 28 and 30 were early dates for the ripening of wheat.

Messrs. Carter's new wheats, according to the reports forwarded to me by several growers, appear to possess in a high degree the vigour of constitution which is often observed in crosses either among plants or animals. One of the growers writes to me that the cross grows very vigorously, "in fact it runs right away from the ordinary wheat." This account agrees with my own observation of Vilmorin's red-chaff white wheat (Dattel), a cross which I saw growing last summer, the straw being long and stiff, and the grain, as I have since heard, proving to be bold and of good quality and colour, yielding above the average.

The only further comment I shall offer on the various facts and reports of experiments which have now been submitted to the reader is, that if English farmers are to grow wheat successfully they must cultivate only those varieties that possess the merits of early maturity, abundance of straw of fine quality, productiveness, and high quality, so that in view of keen foreign competition the grain may hold its own in the estimation of millers, or prove valuable for mixing with the hardest grains of India and America.

XI.—*On the Growth of Mangolds, Cabbages, Kale, Kohl-Rabi, and Silage Green Crops, as Substitutes for Turnips, and of Catch Crops to precede Roots.* By JOSEPH DARBY.

ALTHOUGH English farmers have a wide choice of root and green crops, one and all capable of very perfect development under fitting management, they have generally during the past half-century limited their selections to a very few. To such an extent is this the case, that in the fourfold course of cropping the term "roots" has been commonly applied to that fourth part of it which designates the year in which the land shall not have grain or grass, and roots are understood to be chiefly swedes, turnips or mangolds. At the latter part of the

last century and during the early years of the present one, when Arthur Young gave so many graphic descriptions of the state of English farming, and the reports of the Board of Agriculture were being published, even common turnips were only to a limited extent cultivated. The Swedish turnip had only recently been imported, and mangolds were altogether unknown. On the other hand cabbages appear to have been grown by the best farmers of some districts quite as much as turnips, and we find notices of kohl-rabi by Arthur Young, although he gives it another name, viz. Reynolds' turnip-rooted cabbage.

Common turnips appear to have been first introduced into English husbandry in Norfolk by Viscount Townshend early in the eighteenth century. Kent, in his *Agricultural Survey of Norfolk*, says that he attended George I. to Hanover in the capacity of Secretary of State, and "observing the advantage of this valuable root as there cultivated, brought the seed and practice into England and recommended it strongly to his own tenants, who occupied a similar soil to that of Hanover. The experiment succeeded, and by degrees it gradually spread over this county (Norfolk), and in course of time to other parts of England, though their cultivation was by no means so general as it continued to be in Norfolk." This same nobleman, after introducing turnip husbandry on his estate at Rainham, became so enthusiastic on the subject that he was dubbed "Turnip Townshend." To his exertions appear to have been referable that important revolution in Norfolk husbandry to which Arthur Young alludes when he says:—"For 30 years, from 1730 to 1760, the great improvements in the north-western part of the county took place which made the county in general famous." The swede turnip, it appears, owed its introduction into Norfolk to Dr. Miles Beavor at a much later period, in 1789.

We shall find by studying the statistics in the Government Returns that there have been no very great changes in the breadths of land appropriated to swedes and turnips, in proportion to that of other green crops, since the period when it became customary to give a division of them. In the northern part of the kingdom, where the climate is most suitable, they have certainly not decreased much. Mangolds, which so often prove the root of scarcity in backward springs, have increased more and more in favour with the agriculturists of many districts every year, and, but for the large quantities of manure they require, would no doubt make much more extensive headway on farms where swedes and turnips are so often smitten with mildew or club-root, or are rendered difficult to obtain at all in arid summers. The variations in the culture of cabbages,

kale, and kohl-rabi do not appear to be great, taking the country generally, although in some districts they have increased very much indeed. Catch-crops, too, owing to being much better adapted for certain soils and special parts of the kingdom, naturally increase in cultivation far more rapidly in some counties than others. The subjoined Table, compiled from the Agricultural Returns, will show the acreages of the different varieties of root and green crops for the whole of England in the years 1870, 1878, 1884, and 1888; the particulars of the tillage land, permanent pasture, and rotation grass crops having also been added.

Crops	1870	1878	1884	1888
	acres	acres	acres	acres
Swedes and Turnips . .	1,641,686	1,466,973	1,472,124	1,391,427
Mangolds	299,920	334,397	319,379	352,050
Cabbages, Kohl Rabi, and Rape	140,074	163,840	140,163	151,061
Vetches, Lucerne, and other Green Crops . .	305,424	400,834	383,741	379,591
Rotation Clover and Grass	2,764,777	2,785,097	2,544,805	2,746,903
Corn Crops, including Beans and Peas . . .	7,570,279	7,274,811	6,645,139	6,400,921
Cultivated Land, exclusive of Permanent Pasture	13,729,107	13,403,235	12,646,924	12,348,594
Permanent Pasture . .	9,680,211	11,009,580	12,197,566	12,615,889

The first thing to attract observation on an examination of the above Table is the very considerable decline in the culture of swedes and turnips since 1870, the decrease, according to last year's returns, amounting to 250,259 acres. Is this referable to the enormous conversions of arable land to pasture during this period, or to other root and green crops having taken the place of swedes and turnips? Apparently partly to one cause and partly to the other; for while the entire tillage area shows a diminution of no less than 1,380,513 acres since 1870, mangolds, cabbages, kale, and all other green crops, exclusive of rotation grasses and turnips, have increased 137,284 acres. While the decrease in the turnip acreage is rather more than one-fourth part of the entire cultivated area, these increases in other root and green crops so far balance the account that the falling off, taken altogether, is only one-twelfth part of the total decrease of the tillage area. By analysing the Agricultural Returns it will be found that the decrease of 1,380,513 acres is made up as follows:—

	Acres
Grain crops	1,169,358
Root and green crops	112,975
Rotation grasses and clovers	19,874
Potatoes, carrots and sundries	78,306
Total	1,380,513

The increase in the acreage of mangolds is a very large one, amounting to 52,130, or about 14 per cent.; nor has this increase in cultivation been limited to the period under review, as the compiler of the *Agricultural Returns* for 1871 made the following statement:—"The extended cultivation of mangolds in Great Britain is strikingly marked by the increase in five years from 1867 to 1871 of 102,000 acres, or nearly 40 per cent." The mangold has been termed the "root of scarcity" because stores of it come so serviceable in cold, backward springs, when turnips and swedes are all consumed and the grass refuses to grow. But this is not the sole cause of its increasing favour, the fact being that the great risk of being able to calculate on growing swedes and turnips successfully throughout the southern half of the kingdom, so largely dependent as it is on the non-occurrence of a season of prolonged drought, leads many farmers to turn their attention to something on which they can more certainly rely, although at a little more expenditure in manurial outlay.

Occasionally, as in 1885, the mangold suffers in common with swedes and turnips from an adverse season. In that year the unnatural coldness caused all roots in common to be very small, but in general, owing to the planting of mangolds taking place in April or the early part of May, not only does the seed stand every chance of germinating so as to afford what is termed "a good plant," but the young plants themselves have ample time to get deep-rooted ere any scorching atmospheric influences are experienced. In Scotland and a few of the northernmost English counties, as well as on all mountainous tracts where the summer climate is humid, the swede turnip can likewise be cultivated early, and its success in consequence be made almost as certain as that of mangolds further south. But throughout a large portion of the southern half of England, seeding the land for swedes is deferred until the middle of June, and in some cases close up to midsummer, solely to obviate the ruinous mildew which is said always to blight the crop in an arid summer, if the seed be put in earlier. But too frequently, in endeavouring to escape from this evil, the cultivator encounters a far more formidable one; for should the weather be very dry at the sowing season and continue so for a month or six weeks sub-

sequently, he seldom gets a plant, much less a crop, over extensive districts of the kingdom. In 1887 the seed which was deposited after the first four or five days of June remained in the land without germinating until the August rains came. The losses of that year were enormous, owing to the short crops of swedes and turnips. In far less perilous summers the difficulty of obtaining satisfactory crops appears frequently to be experienced owing to myriads of turnip fleas devouring the young plants as rapidly as they make their appearance. All this being considered, it seems by no means strange that farmers residing in districts where swede and turnip crops cannot be put in early should crop at least a portion of their land appropriated to root and green crops with those on which they can calculate with the greatest certainty.

Cabbages, Thousand-headed kale and kohl-rabi may be made use of as substitutes for turnips and swedes as well as mangolds, and the cost of growing kale and kohl is not usually considered to be more than that for swedes. Further, while requiring less manure than mangolds, they are equally sure in succeeding well. Farmers who find it difficult to rely on turnip crops can also fall back on vetches, trifolium, rye, and winter oats, which, when autumn-sown, occupy the land at a period when it would probably otherwise be either fallow or growing weeds. These crops, if cut for green fodder just when they have attained their maximum growth, might be converted into silage, and the soil be still available for growing swede and turnip crops the same year. There appears to be great gain, from several points of view, in taking this course, and no doubt it has been adopted largely since the ensilage system was introduced some four or five years since. In the first place, the tillage expenses need not be increased, and on tolerably clean land there would be many less weeds by two croppings taking place instead of one. In nearly all cases where land intended for swedes and turnips is kept idle throughout winter and spring, three, and sometimes four, ploughings are given, the amount of additional cleaning being very great indeed.

The assertion has often been made that catch crops can only be advantageously grown when the land is perfectly clean as well as in a good state of fertility ; but, in the course of correspondence with practical farmers on the subject of this paper, I have been informed by a gentleman of great skill and excellent judgment that he considers it by far the most economical and remunerative course on all heavy or medium soils to sow vetches in the autumn if the stubbles are foul, to ensile the crop in June, and give the land fallow working for six weeks, then to take a crop

of mustard, to be sown about the last week in August, for sheep feeding or for a second silage crop, as may be most convenient.

Many cases could be mentioned of the heavy Weald clay district of East Sussex, and a portion of Surrey, having been greatly benefited by the introduction of the ensilage system. On the farm of Major Cazalet, near Dorking, 300 acres being arable, no roots whatever are grown, some 400 tons of green fodder affording sufficient silage for them to be dispensed with. Lieut.-Col. Coussmaker, at Westwood, Guildford, in cropping 112 acres of arable, depends on mangolds and Thousand-headed kale, by appropriating $5\frac{1}{2}$ acres to each, which, with 3 acres to cabbages and carrots, and about 15 acres of trifolium and vetches, and a still larger area to Italian ryegrass for silage, make up his winter supply of succulent food, unless able to grow some swedes and turnip after the catch crops. On Mr. R. Whitehead's farm, at Old Paddockhurst, nearly 500 cattle and 400 sheep, besides horses, are wintered chiefly on silage, the manager, Mr. Abbott, giving it as his opinion that from 10 to 12 tons of silage per acre can be obtained at less than half the cost the growth of any kind of roots would entail on this kind of land.

Even in Scotland, where the climate is so much more favourable to the growth of swedes and turnips than that of the greater part of England, and a more limited number of other green fodder crops are available for selection, substitutes for roots have been sought after for the heaviest clay districts. Mr. John Speir, on Newton Farm near Glasgow, grows no roots at all, although the extent of his arable land is 365 acres. Italian ryegrass appears to be the chief substitute.

At West Shefford, Hungerford, the farm occupied by Mr. John Brown is a very wet heavy soil on chalk; still he grew no less an area than 72 acres to catch crops last year, 50 of which were afterwards sown to turnips and swedes, his total acreage of the latter being 42 acres and of the former $37\frac{1}{2}$. His method of cultivation is that which Mr. Frederick Street stated in the discussion at the Farmers' Club in November 1888, as being the best for making sure of a good seed-bed for swedes on a strong wet soil, viz. to plough only once after surface-cleaning in autumn, and employ the cultivator instead of the plough in spring.

Among practical agriculturists Mr. Charles Howard of Biddenham has always been known to hold sound views. For many years past Mr. Howard, although a large grower of swede turnips, has cultivated considerable acreages of kohl-rabi, cabbages and mangolds likewise. He says: "I have found kohl-rabi an excellent substitute for other roots. No better food can be grown for

sheep. I always have a breadth of cabbages which supplies me with food during the very often trying months of June, July, and August. In cultivating clay soils intended for roots, all ploughing should be done in the autumn, and only scarifiers, drags and harrows be employed in the spring."

In the Wold districts, and on light soils generally, swedes and turnips are usually accounted too valuable to be displaced. Fed on the land by sheep, they are the foundation of good husbandry, especially when the animals consume oilcake or some other auxiliary food. It should not be forgotten that Thousand-headed kale may be made to serve the same object. Mr. C. Kent, a large occupier of land in the Dorset chalk district, considers kale "a good and perfect substitute for swedes and turnips on all soils liable to club-root." He grows over 100 acres of it, but chiefly after catch crops.

Taking another large Wold farm in a different district, Mr. T. R. Hulbert, of North Cerny, Cirencester, occupies one containing 790 acres of arable land, devoted 45 acres to catch crops, 35 of which were consumed green, and 10 acres converted to silage. Again, Mr. R. W. Hobbs, another light land farmer of the same county (Gloucester), grows not only the whole of the turnips, but mangolds and swedes extensively after catch crops. Mr. Hobbs says :—

"I require a large quantity of rye, vetches, &c., for my ram lambs in the summer, and get what roots I can after them. I have planted more rye than usual this season, with the intention of converting a large portion of it into silage."

Surely it is well worth pausing here to consider how vastly the national wealth would be increased if farmers of light land more generally followed Mr. Hobbs' example by growing two crops instead of one in the root year. Out of 153 acres that came into course last year, he carried out this system with 127, leaving only 26 acres not preceded by a winter crop. The flocks and herds of the kingdom might be increased to a prodigious extent by the adoption of such a wise policy, with very slight additional outlay.

Mr. Bernard Dyer, B.Sc., in a paper read by him at the Farmers' Club on November 5, 1888, dealt with the scientific aspect of this matter as follows :—

"The greater part of a green crop—say from 80 to 90 per cent. of its weight when cut—consists of water. The remaining dry matter consists mainly of carbonaceous material derived from the air. Of this carbonaceous matter some is removed when the crop is cut, and some—a heavy weight per acre—remains in the soil to decay in the form of roots and root fibres, adding to the vegetable mould present in the soil. But the dry matter in a

crop is by no means merely carbonaceous; all vegetable matter contains nitrogen; and in an autumn green crop there is carried away such and such a number of pounds of nitrogen per acre—as well as a not insignificant weight of mineral plant food. . . . Is not, then, the following root crop robbed by the autumn catch-crop, which is surely appropriating the good things in advance? No, for in autumn the root crop is not sown, nor will it be sown for many months. It is not there to get for itself the good things then in the soil; but the catch-crop is there, and gets them. But would not the good things of the soil remain there intact but for the catch-crop, and be in due season appropriated by the main crop? No, for the chief of the good things is nitric acid, in combination with lime, in which form it is one of the most soluble materials that exist, so that it is readily washed down into the subsoil and into the drains by the rains of winter; a portion only of the autumn store being left till the following summer for the use of the roots. . . . The idea that autumn cropping impoverishes the land is based upon a misconception of the chemical economy of the soil, and so far from temporarily exhausting or lessening its fertility by catch-cropping, we rather retard the exhaustion of that fertility, and so in effect increase it.”

What is there then to prevent farmers, even in those districts where root growing is most highly appreciated, from filling up that long interval of autumn, winter, and spring by growing crops which, whether fed on the land or converted into silage, abstract very little fertility, and indeed add greatly to the manurial resources of the farm when additional produce is consumed? In Norfolk, obtaining good crops of swede turnips is considered to lie at the very foundation of successful farming. The Norfolk man will not do the slightest thing to imperil the chances of a crop so valuable, because he will tell you he mainly depends on his swedes for the fattening of cattle in winter. In all probability he would secure this object just as effectually by taking a crop of rye or early vetches or mixed winter oats and vetches in the long interval from the autumn of one year to the early spring of the next; but so long as he is under the apprehension that such would not be the case it is in vain to argue with him. Too often he does not get what he desires, with all the waiting and tiresome costly processes that have to be attended to in the long interval, and then his loss is great indeed. He forgets that the catch crop he might almost always make certain of obtaining would most likely be of equal value to the average of such swede crops as he is in the habit of growing. And this is to be gained well-nigh cost free, inasmuch as the same rent, outgoings, and the major part of the tillage expenditure have to be borne whether one crop be taken or two.

Probably Norfolk farmers, and many others who fallow for swedes and turnips, do not require immense quantities of arable green crops for sheep-feeding on the land during the spring and early summer: consequently in the past they have not cared to grow them. But now that we have the ensilage system, there

is every reason why they should alter their tactics, for silage answers the same purpose as roots in winter feeding for beef, and they might fatten more cattle. Ram breeders are able not only to feed off large breadths of catch crops to advantage, but the high feeding with oilcake or home-grown corn regularly pursued for a considerable portion of the flock dovetails well into the intensive cropping, rendering large expenditures in artificial manure scarcely necessary.

In reference to opinions expressed that mangolds and swedes possess far more fattening qualities than cabbages or kale, it may be said that they differ very much not only when obtained from different soils and under varied conditions of culture, but according to the age of the roots themselves and the period of the year at which they are tested. Dr. A. Voelcker has, however, laid down the rule, as ascertained after repeated chemical analysis, that "weight for weight cabbages and swedes possess nearly the same nutritive value."

It is sometimes said that considerable expense is involved in removing the waste stalks and roots of kale and cabbage, but such certainly is not always the case. In riding over Mr. Robert Russell's farm on one occasion I passed a breadth of land where a heavy kale crop had been fed off by sheep, and the teams were engaged ploughing it and burying completely the whole of the stalks. Possibly, difference in soil may account for this. Mr. Russell occupies a hill farm on a chalk subsoil, but some deep bottom lands of rich natural fertility may possibly develop roots and stalks much larger, unless early feeding has been resorted to. On another point abundance of testimony can be adduced, that although cabbages do not stand frosty weather well when perfectly ripe, kale will do so under any circumstances; and even supposing frosts should scotch it in the depth of winter, fresh sprouts would spring from the heads in February and March, and prove highly acceptable to young lambs.

In fact, the custom of growing kale with swedes is becoming very common for this very purpose of securing abundant succulent food for young lambs. Mr. John Barton, the Hampshire ram breeder, adopts it. Mr. W. Jeffery, Waterside, St. Albans, states the advantage to be that of getting "a good picking" of greens for the lambs, before the swedes commence to sprout. Mr. J. Webster, Castlebury Farm, Ware, grows alternate breadths, twenty yards each in width, of kale and swedes for March and April feed, the lambs going outside the breach, and their dams clearing all up behind. For May he has a field all kale, but the ewes are fed mostly on mangolds supplied in the breach. This system of growing swedes and kale together is probably

more generally adopted by sheep breeders in the southern and south-western counties than is commonly supposed.

Mr. Robert Russell, on the Horton Court Lodge Farm, has certainly shown Kent farmers how to make kale perform the duty of affording abundant food for flocks during every month of the year. I have frequently seen kale being fed on his farm as early as June, while throughout July and August it forms the staple food for the lambs, being a substitute for rape. Cabbages are preferred by Mr. Russell even to kale for autumn food, but throughout winter and often far into the spring all the sheep in the farm are allowed as much kale as they like to eat; and they not only thrive well on it but are pre-eminently healthy. There are seldom any abortions or stillborn lambs, and 300 ewes have more than once passed through the critical period of lambing down without the loss of a single one of them.

Dealing strictly with the economical features of kale growing, those who form the impression that the crop is a ravenous feeder on nitrogen, and ought always to be heavily dosed with rich farm-yard manure, will perhaps somewhat modify their opinions when informed that Mr. Russell never applies it, his invariable custom being to give 3 cwt. of bone-manure per acre, and nothing whatever else, for kale.

In the neighbourhood of Tamworth Mr. Henry A. Howman cultivates Thousand-headed kale largely for dairy cows. In a paper read by him at the Eastern Counties Dairy Conference he stated that he regarded Thousand-headed kale as the most valuable of all green crops for dairy cows, as "sown in April and well manured it will be fit for cutting at Michaelmas, and if the stalks are left to stand they will shoot out again and yield another good cutting at Lady Day."

A singular course in growing successional silage crops one year after another, a mixture of spring vetches, oats, and peas being employed to carry out the object, is taken by Mr. C. G. Johnson, The Croft, Darlington, on 23 acres of land. For three years past he has grown the same green fodder of this variety for conversion into silage, and will sow his fourth crop for it this spring. Heavy weights of produce are raised, and the continuous green cropping keeps the land perfectly clean without there being as yet any sign of the slightest falling off. Mr. Johnson manures the land every year with 10 tons per acre of nightsoil, which is carted three-quarters of a mile.

Great interest appears to have been excited amongst occupiers of clay soils in South Durham and North Yorkshire in the growth of silage crops as substitutes for turnips and swedes. On January 17, at a meeting of the Northallerton

Agricultural Society, presided over by Mr. John Hutton, a landed proprietor of the district, statements were made by the Chairman and others, that owing to the great costs and risks suffered in the past in root-growing, they considered it would be a great boon to substitute such crops as Mr. Johnson advocates.

Another instance is afforded of growing mangolds, swedes, and cabbages continuously on the same land by Mr. Henry Adkins, Ley Hill, Northfield, Birmingham, who occupies 170 acres of his own which was formerly half arable and half pasture, but with the exception of 12 acres it has now been all laid down to grass on which a large milking herd of Shorthorns is kept. Mr. Adkins calculates that his swedes cost him 14*s.* per ton, his mangolds 17*s.* 6*d.* per ton, and his cabbages 17*s.* 9*d.* per ton, they being grown on the same land one year after another at an expenditure in manures per acre of 5*l.* altogether.

All investigations of the kind only show the necessity of soil, climate, and situation being allowed to determine to a far greater extent than they do at present the systems of farming pursued and the kinds of crops cultivated. What is best for one set of circumstances would be unsuitable and perhaps ruinous for another. The Northumbrian, like his Scotch neighbour, lavishes his farmyard manure without stint on the swede crop. He lays it on affluently and covers it up several inches thick beneath the ridges where the seed is to be sown, and even then he is not satisfied unless 7 or 8 cwt. of bone-manure be applied per acre as well by the drill. His object is to get a big crop approaching to, if not exceeding, 30 tons per acre, and as he can sow in April or early in May, and northern summers are usually much more humid than those of the south of England, he is actuated by the conviction that there is every chance of his enterprise and large expenditure proving successful. Whatever dung remains unappropriated by the roots is fertility in reserve for the succeeding barley crop; and although in a strictly pecuniary sense the worth of the swedes may not equal their cost, he considers farm economy can be better insured by stimulating the fullest and heaviest yield of roots possible than in any other way. If he does not get an immediate return he hopes to obtain it in the long run.

In numerous other districts further southward the same heavy expenditure would be calculated to give more certain and far ampler results with mangolds than with swedes, because the climate is so much more favourable for the former. We find circumstances completely reversed in the respective adaptations of the two crops for the north and for the south. The mangold, which cannot be depended on very much where summers are

cold and winters commence early, luxuriates in the warm sunshine of the south, and yields heavy weights of roots per acre in the very situations where swedes only give moderate results, even if it be possible to grow them at all. Cabbages equal in weight per acre to any root crop can also be raised in many localities, and it need scarcely be observed that, in regard to nutritive property and being well adapted for all kinds of stock-feeding purposes, few crops possible to be grown can surpass the cabbage.

Large numbers of farmers in the east and south of England, while readily admitting all this and also the possibility of growing silage crops advantageously on clay soils as substitutes for swedes and turnips, still hold the opinion that the latter must be made the foundation of good farming on all light and medium-class soils, because of the convenience and wise policy of feeding these crops off on the land with sheep in winter. There are several other crops, however, adapted to the same management. Thousand-headed kale, for instance, may be fed off on the land by sheep at any period of the year, and being a very hardy plant calculated to withstand severe winters even better than swedes, it seems peculiarly well adapted in February, March, and April for consumption by flocks on large light-land arable farms. And what gives this argument still more force is the abundance of dainty feed for young lambs in the tender shoots of the kale heads throughout spring. The food is peculiarly wholesome also for both ewes and lambs, and can be given to in-lamb ewes in any quantity without the slightest risk, whereas feeding them on full meals of turnips often leads to abortions and stillborn lambs.

Nor does it at all follow that only those roots and grain crops that remain standing on the land are to be fed off by sheep on the breaching or folding system. Mr. Johnson has thrown out a suggestion worthy of attention, that when silage crops are grown as substitutes for turnips and the owners would prefer the produce being fed on the land where it was grown, a stack could be built in the middle of the field, and at the most convenient season a flock could be breached evenly all over it while consuming the silage. The advantage of adopting this course would be very great when turnips are made to succeed a silage crop, as the roots and silage could be fed off together.

Flockmasters in some districts are accustomed to feed off mangolds in the same way, they being placed in small heaps and clamped at the period of lifting in October or November, the consumption by sheep often not taking place until towards the end of winter or during spring. When this course is pursued

it has sometimes been found advisable to utilise the land for the growth of a second crop of rye, or winter oats, to be fed off in spring with the mangolds, and, by placing the mangold clamps in straight lines at a considerable distance apart, very little of the land need be left uncropped the second time. There is also another system which some prefer to adopt—that of intermixing small quantities of kohl-rabi seed with the mangold seed in drilling, the first object being to make sure of having plants that will transplant well, should the season be so unfavourable as to cause the young mangolds to be set unevenly. But even if the young kohls have not to be transplanted into vacant places, a great many would be sure to be left; and, in singling out, the aim is to leave a considerable number of them, it being considered that they do not injure the main crop. The mangolds go ahead and dwarf the kohls, very little being seen until the former are lifted and clamped in October; but afterwards, having ample space for development, they revive and often attain a good size during winter, so that in spring, when the mangolds have to be fed off, the kohls supply a large amount of extra keep.

Although crops best suited for heavy soils have been abundantly treated on in the preceding pages, nothing has been adduced respecting the possibility of finding substitutes for turnips in the barren heath districts, where scarcely anything meets the eye but beds of sands on which the culture of any kind of roots has always been considered extremely hazardous. Not only are there the Norfolk blowing sands, but the dismal tracts of Bagshot and extensive regions in the neighbourhood of the New Forest and on the borders of Poole Bay. Very evident must it be that treatment of an exceptional kind must be applied to land in such regions if anything is to be made of them. Mr. Clare Read has expressed his opinion very decidedly that nature intended them for rabbit-warrens, and the sooner they are returned to that condition the better. But Mr. Henry Woods has held out the hope that by cultivating crops best adapted to these lands and converting them to silage, their redemption from utter uselessness might be secured.

No farm has come under my observation on which greater departures from ordinary systems of cropping have been adopted on one and all of the broad lines treated on in this paper, than that of the Aylesbury Dairy Company at Stammerham, Horsham, Sussex, under the able management of Mr. G. Mander Allender. The extent of land under occupation reaches altogether to 1,400 acres, 600 being arable. Roots and green crops, irrespective of the grass rotation, usually range from about 122 to 145 acres,

consisting of mangolds, cabbages, and Thousand-headed kale, besides trifolium and ryegrass raised as silage crops. In addition to this, large quantities of silage are made from the meadows and rotation grasses. Silage to the amount of 550 tons was made altogether last year in four large stacks, the proportion to trifolium amounting to 200 tons.

Now this is of course a farm in another part of the kingdom to Norfolk, and one where dairy cows are chiefly kept, and very few sheep, comparatively speaking, exist. But, apart from being an exemplification of arable dairying, there are some interesting and instructive features, which might no doubt be studied to advantage by a very large number of farmers irrespective of geographic situation. Thus, as to keeping the land cropped, and making one thing follow on the heels of another rapidly, nursery beds of young cabbages are provided, so that, to quote Mr. Allender, "cabbages are always going." As fast as a green crop is taken off the land it is ploughed, and plants set in, because cabbages come always useful.

Probably no Norfolk farmer has in recent years made a greater departure from Norfolk ways and customs than Mr. R. Hunter Pringle, who occupies 585 acres of arable land at East Mean, Watton, his farm bordering on the "blowing sands" district which has such an ill reputation for having ruined many farmers. He entered thereon five years since, and after finding corn-growing a certain and heavy loss, he determined to abandon it as much as possible, and proceeded subsequently to shorten very much his breadths of turnips and swedes likewise. Finding that to grow common turnips fit to stand the winter well, and to be fed off on the land, small roots only could be raised such as would be considered only half crops in a Scotchman's eye, he discarded them, being convinced that direct profit from swedes was highly improbable, but that mangold wurzel crops were worthy of more attention than they generally received.

Mr. Pringle soon settled down into a system of lengthening out the grass rotation, notwithstanding that everybody he happened to meet told him the same story, that land must not remain in rotation grass more than a year in Norfolk. In 1885 he seeded down 70 acres, of which 30 belonged to the blowing sand district. He intended to plough the whole of it up after the second year, but by good management it has been too valuable ever since to be parted with as alternate pasture.

Altogether Mr. Pringle has reduced his tillage to 100 acres for corn, and 50 acres for roots and green crops annually, and is of opinion the farm should not be ploughed more than this, the

system best for it being, after seeding down as large an area as possible to suitable grasses and clovers, to allow the layers to remain as long as they will bear well, and only plough up such breadths as show absolute signs of failing.

Glancing from east to west to the borderland of South Wales, Mr. Richard Stratton, The Duffryn, Newport, affords an example of a practical man who is about to change his system considerably, not for the purpose of doing away with swedes and turnips, but to fill up the gap between harvest and the period of sowing, by the extensive culture of green crops for silage.

A farmer having satisfied himself that it is possible for him to grow two crops instead of one in the long interval between corn harvest and the sowing period for roots the ensuing year would naturally, of course, regard the matter from a financial point of view. Professor Wrightson recently pointed out that the cost of the swede crop when grown after rye fed off by sheep need not much exceed 3*l.* per acre in the south-western counties, although the rental of the land with outgoings, and every item of expenditure, be placed against the crop. The respective items in his calculation are as follows: One ploughing, 8*s.*; two double draggings, 4*s.*; two double harrowings, 2*s.*; one rolling, 9*d.*; one drilling with water, 5*s.*; one harrowing, 6*d.*; one rolling, 9*d.*; two horse-hoeings, 2*s.*; one harrowing, 6*d.*; two hand-hoeings, 9*s.*; 3*lb.* of seed, 3*s.*; 2 cwt. of superphosphate, 6*s.*; rent, rates, and taxes, 1*l.* 10*s.* Total cost 3*l.* 1*s.* 3*d.* It will be noticed that very little manure is here estimated for, which is referable to the sheep leaving so much by feeding off the rye, that 2 cwt. of mineral superphosphate suffices to bring a good crop.

Mr. R. Hunter Pringle has placed in my hands a very different calculation of the cost of a crop of swedes, grown after a winter fallow, which is as follows:—In autumn light ploughing, 6*s.* 6*d.*; two heavy harrowings at 9*d.*, 1*s.* 6*d.*; four harrowings at 6*d.*, 2*s.*; rolling 10*d.*; two harrowings at 6*d.*, 1*s.*; one chain harrowing, 10*d.*; gathering and burning weeds, 5*s.*; one deep ploughing, 8*s.* In spring two grubblings with 3 horses at 9*d.*, 1*s.* 6*d.*; two harrowings, 1*s.*; gathering and burning weeds, 2*s.* 6*d.*; one grubbing with 4 horses, 1*s.* 6*d.*; opening drills, 2*s.* 6*d.*; sowing artificials, 6*d.*; splitting drills, 2*s.* 6*d.*; drilling seeds, 6*d.*; three horse-hoeings at 1*s.* 3*d.*, 3*s.* 9*d.*; two hand-hoeings, 8*s.*; topping and tailing, 5*s.*; storing and covering, 2*s.*; grinding for sheep, 5*s.*; rents, &c., 1*l.*; fifteen loads dung at 4*s.*, 3*l.*; carting and spreading, 13*s.* 6*d.*; two cwt. dissolved bones at 5*s.*, 10*s.*; which would make a total of 8*l.* 12*s.* 5*d.* But Mr. Pringle remarks that if artificial manures were solely depended on the account might be much lightened, 1*l.* 10*s.* being charged for manure

instead of 4*l.* 3*s.* 6*d.*, and the total cost of the swede crop be reduced to 5*l.* 18*s.* 11*d.*

The cost of a crop of swedes must of course vary considerably with the heavy or light nature of the soil, and also as to its state of cleanliness. Perhaps it may be considered by some that Mr. Pringle has debited a little too much for tillages; but, on the other hand, it must be admitted that 1*l.* per acre for rent and outgoings is scarcely sufficiently high, and it will be observed that in Professor Wrightson's estimate 30*s.* was charged. Having elicited the opinions of several practical agriculturists on the point, I proceed to quote from some of them. Mr. Richard Stratton says:—"As to the cost of growing swedes, if artificial manures are employed, I should put it on my land at 4*l.* 10*s.* per acre; but if farmyard dung be used, from 4*l.* to 5*l.* per acre extra." Mr. Arthur S. Gibson estimates the cost of the crop at 7*l.* 8*s.* per acre for tillages and manure alone, rent and outgoings having to be added, which naturally vary considerably in different parts of the kingdom. Mr. H. J. Sheldon states that it so much depends on circumstances that the expenditure may easily be run up to from 10*l.* to 12*l.* per acre, a full supply of farmyard manure being allowed. Mr. R. H. Hobbs can manage to bring his swede crop into debt only some 3*l.* 5*s.* per acre; but this is of course when a previous green crop has been fed off and only a little superphosphate or bone-manure required. Mr. J. Parker Toone states that in the neighbourhood of Lutterworth, if a moderate dressing of farmyard dung be given together with artificial manures, the costs of tillages and manurings would be about 6*l.* 10*s.* per acre. Mr. Charles Kent, one of the largest of the Dorset chalk-land farmers, after mentioning that the cost depends on the state of the land, says:—"Nearly all our root land is sown to a green crop, first for sheep feed, and sometimes two crops of swedes are grown in succession, when the first is kept on the land late and spring, the flocks consuming it too late in April for barley-sowing." Hence he considers the cost to range on the Dorset hills from 3*l.* to 5*l.* per acre, irrespective of rent and outgoings. Mr. Hulbert gives an estimate not far different for the Cotswold district.

What, then, does the catch crop cost, and what is its value when obtained? So far as trifolium is concerned, it is very little indeed. There are thousands of acres raised, involving a less expenditure than 15*s.*, five or six of my correspondents placing it as low as 10*s.*, the purchase of the seed itself and the labour of sowing and scratching it into the stubble with a light pair of harrows being all that is deemed requisite. If the stubbles have to be surface-worked or ploughed previously to

sowing as well as when superphosphate or kainit is applied as manure, the cost is of course added to. Seldom, however, does it exceed 25s. per acre, and even when manures are applied is often under 1l. Naturally, then, wherever there is a reasonable chance of obtaining a crop, the risk of loss is so very slight that it would be folly not to encounter it, especially now that any surplus quantity of green crop not required as summer forage for stock can be placed in ensilage stacks for conversion into silage. *Trifolium* cannot be grown very far northward, however, and as early sowing is all-essential, late harvesting seasons like that of 1888 naturally cause less breadths to be sown than when the corn can be gathered in during August.

Other catch crops that are autumn sown, such as rye, winter oats, vetches, mixtures of some or other of the foregoing, and Italian ryegrass, cost more, not only because the land has to be ploughed, but from the seed being more expensive. Mr. Henry Woods gives the costs of tillage and manuring for winter oats at 2l. 8s. 5d. per acre. If no manure is applied it would be about 1l. less. This would also be sufficiently near to be allowed to stand for rye; the seed of vetches, however, would, as a rule, cost more than that of rye, bere, or winter oats.

The value of the produce may, of course, be variously estimated according to the use made of it. When large flocks have to depend almost entirely on it in the early summer months, or when urgently wanted for dairy cows, horses, and other stock, this can scarcely be estimated too highly, and there would appear to be a further very considerable gain in lightening the manurial no less than the tillage costs of the succeeding swede or turnip crop. The actual saving may range from 2l. to nearly double that amount per acre, for whereas some of the Wold and chalk-land farmers are able to make 2 cwt. per acre of superphosphate suffice in manuring for swedes after catch crops have been fed by sheep on the land, Mr. Treadwell, by feeding off vetches with fattening sheep, employs no artificial or any manure whatever for swedes. A point of considerable importance, however, is as to the amount of gain by growing two crops instead of one, when the first is taken entirely off either for conversion to silage or for soiling purposes. In such cases the majority of farmers would probably bestow 10 tons of farmyard manure per acre in addition to superphosphate or bone-manure, and the calculation should probably be made on that basis.

When silage crops have to be grown as substitutes for swedes and turnips, which seems particularly desirable on some of the stiffer soils, the difference in the return would be very much affected by the value placed on the silage itself.

The following remarks of Mr. G. Mander Allender show how very important he considers it to be that a great change in the croppings of heavy soils should take place. He says:—

“Although mangolds should be grown, and perhaps some swedes or other turnips, a good breadth of silage also should undoubtedly be provided. Take roots from the time the seed is put into the ground until the roots are consumed, the crop is one constant expense, to say nothing of the risk from fly, and of the disappointment in a season like 1887, when there were thousands of acres bare of produce where the farmer hoped to obtain food for his cattle for the winter. On the other hand, crops for silage, such as trifolium, ryegrass, or winter tares, beans and wheat mixed, are put in cheaply after harvest, are growing all winter, and come to maturity early the following summer before hay time, without costing one penny for hoeing, &c., &c.; and if the season be favourable, and the farmer has the strength, a second crop either of turnips, cabbages, or maize may—in the South of England at all events—be got in, after the other produce has been taken off.”

The above gives such a fair and reasonable description of the bearings of the question in relation to stiff land that the balance of advantages in favour of the adoption of silage crop sowing need scarcely be adjusted by direct estimates of costs and returns, especially while the worth of silage itself is yet in most cases subject to experiment. That it preponderates very much has been sufficiently proved by the statements of distinguished agriculturists in the preceding pages, and public opinion may be considered growing so rapidly in favour of the adoption of ensilage, that we shall probably find the Agricultural Returns for the next few years show considerable increases in the acreages of those green crops that have been most generally converted to silage.

XII.—*Experiments in Making Ensilage during the Wet Season of 1888.* By H. KAINS-JACKSON.

THE year 1888, and the decade of the *eighties* in the nineteenth century, will be marked in agricultural history by the farm practice of the Ensilage System. This system, as an auxiliary to agriculture, is one of the features of the Victorian era. Centuries commonly pass without the practice of husbandry being marked by any novelties, but the reign of Her Majesty is rich, above all preceding reigns, in examples of agricultural progress. Mechanical mowers, harvesting machines, thrashing and cleaning machines, steam ploughs, haymaking implements, cream separators, and various other labour-saving appliances testify to the scientific advances made in farming; but the ensilage system must be quoted as the solitary and notable instance of any new means having been introduced for the preservation of

green crops in these weather-beaten islands. It is not, however, to consider the general principles and practice of the ensilage system that this paper has been prepared, but to record the efforts made in the past inclement summer by novices driven to adopt alternative methods for saving grass and other crops, upon which, in July and August, the waters beat and the sun refused to shine. Hundreds of ensilage stacks were then built—unwillingly—because there was no choice between them and the deep sea. In consternation, last summer, the farmers throughout England, Scotland, and Ireland saw the forage crops of the year washed and rotting on the meadows, or uncut passing their maturity and becoming rather vegetable wire than succulent herbage. A scramble was then made, partly in despair, partly in hope, to save the deteriorated hay-harvest by the new-fangled process of ensilage.

Luckily for the compulsory experiment, there existed, even by thousands, an advance-guard of agriculturists who had already tried the system, who had found it successful, and who had moreover lifted up their voices, and told in the pages of this Journal, in the columns of the agricultural papers, in blue-books and buff-books, at farmers' clubs, market dinners, and at ensilage exhibitions, how the work should be done.¹ There existed, in fact, quite a library of ensilage books, in which the laws of the system were written, and these had only to be obeyed. Accordingly the new departure was made, and followed out under competent guides; and correspondents from all the English counties, from Scotland and Ireland, as well as from Wales, now write of their experience, and report success won all along the line. From the enforced adoption of the ensilage system last summer forage crops were saved, and a vast amount of animal food was secured for future consumption.

After the above statement it might be supposed that I need only give the details of the successful practice employed, so that others might follow the same course. But I find these valuable details demand too much space for the present article, and may be more conveniently issued in a separate pamphlet, such as is now in preparation. There is further a strong reason that beginners should first make themselves, at least partially, acquainted with the principles and processes of a system such as, through several years, practice and science have endorsed from experiments. The shortest road to knowledge in this

¹ See *Practical Guide to Making Ensilage in Stacks and Silos*, issued by the Ensilage Society (Eyre and Spottiswoode. Price 6d.), giving references to these.

matter is to learn how to make ensilage in ordinary seasons, for such knowledge will prove the surest guide for successfully saving forage crops in a wet season. The most trustworthy directions for making ensilage, and records of successful experiments, exist in the several books, reports, guides, and letters written previously to the practice of the last summer. The recent experimenters, grateful for the means by which much of their property was saved from destruction, extol the system with all the zeal of converts, and whilst great value will be attached to these latest reports of real work successfully done, yet it is desirable that the earlier experiments, made in silos, made also in stacks, and carried out under conviction (from 1883 to 1887) and not of necessity (as in 1888), should form the first part of the education of those who wish to study the theory and practice of the ensilage system.

The schedules of questions which were sent out were not distributed to the past masters of the system, or to others who had been experimenting for years, but to those who were believed to be making first attempts. Correspondents were asked to describe the *exceptional adoption* in the past unseasonable summer of the ensilage system, and the various means of *stacking* and applying pressure to grass and forage crops, by replying to the following questions:—

1. Have you in the past season first adopted the ensilage system; or, having previously adopted it, have you increased its practice by making stacks?

2. By what means in building *stacks* have you carried out your plans: as regards methods of pressure and process of formation? What have been the costs of any *mechanical methods* employed, and cost of horse and manual labour?

3. Dates and period occupied in the work; and whether such work continuous, or, if interrupted, for how long, and why?

4. Please supply any records made of temperature, and whether attempts were made to control it.

5. Does your experience advise you to modify the means, plans, and labour you employed; if so, in what way?

6. Have the crops been satisfactorily preserved; and, in feeding stock, is your ensilage proving valuable food? What has been the proportion of waste?

7. REMARKS:—Generally upon the ensilage system as you have practically worked it out, especial attention being given to the rough-and-ready method employed in the past wet haymaking season.

The replies to this schedule of questions form a bulk of information that demands study in detail, and fully enunciates (1) that the methods followed had beneficial results to a degree that astonished those who had made a farm-use of the ensilage system in saving their crops, which became of great value as stock food; and (2) further certifies that the several means

employed were nearly all alike efficient, and may be accepted as reliable guides. Accordingly, what recently was but a theory has been, by the actual experience of farmers, advanced into a workable system.

At this date, April 1889, the owners of forage crops in the United Kingdom and Ireland have before them several weeks wherein to form their plans for saving such crops in a difficult season, whilst in July 1888 often only a week was afforded to farmers to adopt means of preservation, or to see their grass, clover, and other crops become utterly spoiled. It will, therefore, be prudent for agriculturists to form now a leisurely decision as to the action they will take in the approaching hay harvest; and the following remarks are offered to assist them in coming to safe conclusions:—

Those who have tried both silos and stacks often express still a decided conviction that silos below, partly below, or above the surface, have many advantages even upon the grounds of strict economy (upon which special grounds many inexperienced persons object to them). Silos are convenient, reliable, and allow of weight or pressure being applied cheaply and effectually. Half pressure in a silo appears to equal in results double the force required for making ensilage in stacks, and commonly the waste in silos is much less than in a stack. At the same time, the making of ensilage in stacks is often deservedly preferred under various conditions, such as sudden necessity from bad weather; the distance of a crop from a built silo; and the advantage of placing a store of winter food for stock exactly where it will be most wanted. In this last particular the replies of my correspondents from their practice of last season are of great value, by establishing, on irrefragable evidence, the success of ensilage stacks made under the most unfavourable conditions of weather. Nevertheless the same experiments have determined a vexed question, and tell the unwelcome fact that the waste round the outsides of stacks is considerable in most cases. Perhaps the chief gain in knowledge from the ensilage stack experiments of 1888 is the result that good ensilage may be made without that impermeable closure that is considered necessary in silos. Next, the paramount importance of pressure of forage in a stack is made clear, notwithstanding isolated instances of crops having been preserved without any further pressure than was given in building the mass by treading of workmen, or by the passage of horses and carts over the stack.¹

¹ The Editor has been favoured by Lord Egerton of Tatton with the following very interesting description of the making of Clamp Ensilage at Tatton Farm

One of the most curious impressions made on reading the several reports returned to me by correspondents is the total absence of any new, "rough-and-ready," or "scratch method." Wherever any such independent means have been used, they will be found materially the same as those already covered by patents; and therefore, whilst they might, I suppose, be employed by a farmer himself, he could not sell them to the public. The ensilage forage-cake is, in truth, a product of the kneading, pressing, or treading of grass, clover, or forage. Pressure or squeezing-power can be applied by (1) dead-weights, by (2) weighted levers, by (3) chains and screw-tighteners, by (4) wire-ropes or other ropes tightened by ratchet apparatus, or (5) by lever and hydraulic jacks. Possibly there may be other modified appliances, but scarcely fresh principles of compression.

As mentioned above, all these means of pressure have been patented: the jack by Mr. C. W. Wilson; the levers by the Ensilage Press Company; the wire-rope and ratchet by Mr. Johnson; the chains and screws by Messrs. Reynolds and Co.; the roller system by Messrs. Pearson. Only dead-weights apparently re-

in August 1888, by a process particularly simple and within the resources of every farmer:—

"The stack ensilage on my farm having to a great extent in two previous years failed from overheating and waste, I carried out in August 1888 the making of ensilage on the principle of a turnip clamp.

"Nine acres of a field, which had been laid down to grass about five years, were mown on August 2 and following days. An excavation, fifteen yards long by eight feet wide, and three feet deep, was first made. The soil, which was a fair loam with sandy subsoil, was thrown up on either side, and the turf carefully stripped, to be afterwards replaced. The bottom was hard dry sand, which gave natural advantage. The ends of the excavation were sloped off by an inclined plane rising at the rate of one in five.

"The grass was brought by one-horse carts and delivered into the trench; they passed in succession over the mass, which was spread evenly by hand. After the grass was spread, a roller weighing fifty cwt., and drawn by three horses, was taken over it backwards and forwards so as to consolidate it between the delivery of each load. At night the roller and carts were left on the grass, when it had reached the level of the ground.

"This process was repeated with the interval of one day, until finally the grass was raised three feet six inches above the ground, when it was thoroughly solid from repeated passage of the roller. The soil was then replaced over it to the depth of a foot, including the sods which were replaced.

"The estimated contents of the pit were fifty tons, a cubic foot of the ensilage weighing 56 lbs. The pit was opened on December 19, when it had sunk two feet, viz. to one foot six inches above the level of the ground, and it has been kept open till March 1889, when it was still as good as at first, and it has been eaten freely by young stock through the winter. The temperature as taken in the centre of the mass did not exceed about 120° Fahr., and lowered gradually. The fermentation was subacid, the grass well preserved, and not differing much from hay of a yellow colour. There was no waste, and the character of the ensilage was uniform throughout. It was considered by my bailiff better than the 'pit' ensilage made in the usual way, and heavily weighted with planks and earth.—E. OF T.

main free for public use. Accordingly, where stacks were built in the hurry of 1888, resource was made in most cases to one of the above systems, all of which had the well-earned character of having been previously successfully employed. Here, by the way, it should be recorded that various experimenters, who did not know of the above systems, worked out similar methods for themselves independently, from that common mechanical knowledge which all farmers should, and many do possess. When, however, they wished to extend their own plans and sell them to neighbours, they found the field already occupied by patentees.

The "sweet simplicity" of making good ensilage in a silo where dead-weights are employed, and where the product should neither be sour nor sweet, is somewhat sacrificed when ensilage is made in stacks, where it appears desirable to control the temperature by regulating pressure in order that sweet ensilage be produced. But even this result is attained very easily when either of the above-named systems is employed, as will be told in the detailed narrative made up from correspondents' reports, in the pamphlet about to be issued. Novices may have plans of their own, and may carry them out successfully; but, since they can hardly be less costly in labour and materials, and only slight modifications of those patent systems already existing, beginners will do well to adopt known methods. The above remark applies especially to making *ensilage in stacks*. Where a *silo* exists the non-patented dead-weights of simple earth, bricks, stones in boxes, railway iron, &c., are still much in use with those who have employed them for years, who find them perfectly effectual, and who keep the belief that they are cheaper than most mechanical methods.

The answers given to the questions in the schedule issued to correspondents assert conclusively that

1. Many farmers last season did adopt exceptionally the ensilage stack system as an alternative to hay-making, which the weather had rendered impossible.

2. That they employed commonly the special systems above mentioned; and although, in the hurry of the wet season, they did not often make reliable estimates of costs, these seem to have ranged from 10*l.* to 20*l.*

3. The periods of making these ensilage stacks extended from mid-July onwards, until in October aftermath was used. The work of making was interrupted by various circumstances (such as fine weather occasionally allowing of hay-making), and much of the ensiled crops consisted of the damaged leavings of the hay-making attempts.

4. Temperature was generally controlled, but was often very high, nearer 160° than 120° Fahr. From divergent registers, however, the product was nearly always fairly satisfactory.

5. Most of the experimenters express confidence in the means they employed, and any modifications they propose are trivial. In the case of Pearson's Roller System, further pressure from dead weights is sometimes advised.

6. In most cases correspondents have expressed themselves decisively to the effect that they found their crops effectually preserved so as to become good food for stock. The outside waste, however, was often considerable—6 to 18 inches; but of this damaged bulk a large proportion was eatable when shaken out in the stock-yards or meadows.

7. A large majority of those who tried to make ensilage stacks last season report that they intend to continue the practice in the future.

From the results shown in several reports, farmers may well follow the advice given by Dr. Voelcker in his recent lecture to the Kendal Farmers' Club: "not to place too much importance upon the matter of making ensilage sour or sweet. This must be made altogether subservient to the general circumstances of the case." It has been found a tiresome matter—where the candle costs more than the game is worth—to watch, wait, test, and control the temperature. Good ensilage is of a neutral character, neither sour nor sweet to any extent. In large silos, as in large stacks, are strata of sweet and sour, both good—as is the case in the large silo of Visct. Arthur de Chezelles, where the practice is to go on filling as opportunity suits. Probably the trouble of making ensilage is trebled the moment special ends are sought. The waiting intervals for the temperature to get a certain height are almost as vexatious and costly in loss of time as waiting for the sun to shine in showery or rainy weather to make hay. The effect of pressure in all cases is to lower the temperature, which can be ascertained by the insertion of jointed iron rods—of various lengths—to which is attached a registering thermometer. Messrs. Vipan & Headly, of Leicester, have a good model with an augur-screw at the end; and Messrs. Dollond, of London, are also introducing one this season at a very small cost (12s. 6d.); whilst ordinary gas-piping with a thermometer inclosed may serve, and be made by the farmer, though he would save very little money by so doing.

The lessons taught by the reports kindly placed at my disposal by correspondents are definite, and may be briefly summarised.

The green crops of the country, taken at their best stage of

growth, may be saved, independently of weather. This was known previously. But it is now proved that fodder, grass, clover, tares, &c., when already damaged—half spoiled—may be saved from further destruction, and become in a stack, under regulated pressure, useful stock food.

The costs of making ensilage are shown to be much the same as making of hay in ordinary times.

The value of ensilage as food, compared with hay as food, is considered so far equal that practical farmers find their stock thrive satisfactorily on either.

In conclusion, I may say in advance, relative to the practical details furnished by my correspondents, whose reports in a narrative form will make up the pamphlet shortly to be issued, that the success of farmers who last wet season made ensilage under compulsion has been such, that in the future their example may be expected to introduce the making of ensilage by choice in all ordinary British summers.

XIII.—*Report on the Experiments conducted in 1888 by Local Agricultural Societies, in conjunction with the Royal Agricultural Society of England.* By Dr. J. AUGUSTUS VOELCKER, B.A., B.Sc., Consulting Chemist to the Society.

IN 1888 the three following Societies continued the experiments initiated in 1886:—

The Essex Agricultural Society.

The Royal Manchester Liverpool and North Lancashire Agricultural Society; and

The Norfolk Chamber of Agriculture.

By each society the experiments were assiduously and carefully carried out; they were duly inspected, and though they exemplified in several cases the impossibility of commanding success, the results obtained point, in the main, to the usefulness of field experiments, whilst considerable interest was aroused by them, both locally and generally.

I.—ESSEX AGRICULTURAL SOCIETY.

(*Abstract of Report of Mr. BERNARD DYER, B.Sc., F.C.S. &c., Consulting Chemist to the Society, and Mr. E. ROSLING, F.R.M.S., of Melbourne, Chelmsford.*)

There were two sets of experiments, (A) continuation of the mangold experiments of 1887, with the object of seeing the effect on a subsequent oat crop of the manures applied for the

mangolds. (B) Experiment on manures for the mangold crop, conducted on lines similar to those of 1887.

A.—Residual effect on a subsequent Oat Crop of Manures applied in 1887 for Mangolds.

The soil was of rich quality, a stiff loam of a clayey nature, resting on a subsoil of white clay containing chalk nodules. In 1887 it was found that the heaviest and most highly manured mangold crops had been followed by the best oat crop, and the results of 1888 are practically in direct confirmation of this.

Table I. below gives the produce for the two years.

TABLE I.

PLOT	Manures per acre applied in 1887	1887		1888				
		Mangolds per acre		Oats per acre				
				Head-corn	Straw			
		tons	cwts.	qrs.	bushels	tons	cwts.	qrs.
A ¹	No dung, no artificials	9	14	2	70.84	2	3	3
O	No dung, no artificials	10	1	3	62.04	1	16	2
F	12 tons dung, no artificials	11	18	0	69.48	2	2	1
J	12 tons dung, 3 cwt. superphosphate	10	9	2	72.00	2	1	3
D	12 tons dung, 2 cwt. nitrate of soda	14	2	0	74.60	2	4	2
C	12 tons dung, 3 cwt. superphosphate, 2 cwt. nitrate of soda	15	12	3	75.60	2	6	0
M	12 tons dung, 4 cwt. nitrate of soda	14	5	1	83.76	2	4	3
L	12 tons dung, 3 cwt. superphosphate, 4 cwt. nitrate of soda	15	5	3	90.04	1	19	0
K	12 tons dung, 4 cwt. basic cinder, 4 cwt. nitrate of soda	14	18	1	83.52	2	6	0
B	12 tons dung, 2 cwt. guano	14	1	1	67.20	2	1	0
E	12 tons dung, 2 cwt. guano, 2 cwt. nitrate of soda	14	11	3	70.16	2	0	2
G	12 tons dung, 4 cwt. guano	16	4	3	69.36	2	1	1
H	12 tons dung, 4 cwt. guano, 2 cwt. nitrate of soda	18	4	0	77.92	2	6	1
I	12 tons dung, 4 cwt. guano, 4 cwt. nitrate of soda	18	19	2	78.60	2	8	3
R	No dung, 4 cwt. nitrate of soda	13	6	3	76.56	2	3	2
N	No dung, 4 cwt. basic cinder, 4 cwt. nitrate of soda	12	7	3	77.12	2	1	0
P	No dung, 3 cwt. superphosphate, 4 cwt. nitrate of soda	16	19	3	72.20	2	0	3
Q	No dung, 6 cwt. guano, 4 cwt. nitrate of soda	18	18	0	80.56	2	5	0
	¹ The mean yield of A and O is	9	18	0	66.44	2	0	0

By a comparison of the unmanured plots (A and O) with plot F it is seen that dung alone gave an increase of 2 tons of

mangolds, 5 bushels of oats, and 2 cwts. of straw, whilst artificials with dung, but without nitrate of soda (plots J, B, G), gave an increase of 1 ton 14 cwts. of mangolds over the merely dunged plot, but no increase in oats. Artificials, including 2 cwts. of nitrate of soda in addition to dung (plots D, C, E, H), increased the produce by 3 tons 14 cwts. of mangolds, 5 bushels of oats, and 2 cwts. of straw over the dunged produce; and artificials with 4 cwts. of nitrate of soda under similar circumstances (plots M, L, K, I) increased it by 3 tons 19 cwts. of mangolds, 14½ bushels of oats, and 2 cwts. of straw.

Where no dung was used, but artificials only, together with 4 cwts. of nitrate of soda (plots R, N, P, Q), the increase over the unmanured plots was 5½ tons of mangolds and 10 bushels of oats. Reckoning mangolds at 10s. a ton, oats at 2s. a bushel, and straw at 2l. a ton, whilst charging the dung with a cost of 5s. per ton, the results, looked at from a monetary point of view, showed that in the two years there had been no adequate return for the heavy outlay on the dung, but that artificial manures had given much better results. Thus 4 cwts. nitrate of soda, costing 2l. 3s., gave an increase valued at 2l. 16s. 6d.; 3 cwts. superphosphate, and 4 cwts. nitrate, costing 2l. 11s. 3d., gave an increase valued at 3l. 19s.; while 6 cwts. guano and 4 cwts. nitrate, costing 4l. 6s. 6d., gave an increase valued at 6l. 3s. 6d. The most costly artificial dressing, where no dung was used, was, therefore, the most economical.

Speaking generally, last year's conclusion was quite borne out, that the best mangold crop was followed by the best one of oats; also that nitrate of soda told very much the second year, though it is uncertain whether this was due to its not having been entirely washed out during the dry season of 1887, or to the amount of plant food left by the rootlets of the more abundant mangold crops, and the tops (which were afterwards ploughed in). In any case, the influence of the nitrate of soda was not gone, and the fertility of the soil not diminished, but rather the reverse. The best result was obtained by the most costly dressing, viz., 6 cwts. of guano and 4 cwts. of nitrate of soda, without dung.

B.—*Experiments on Mangolds.*

This experiment was conducted on a fresh field. Though the rainfall throughout the year was a higher one, at one time in the early life of the mangolds there was a season of drought, and great irregularity in the plant was the consequence. Further than this, inequalities in the depth and nature of the soil manifested themselves clearly, and practically from these

two causes the experiments were upset. Under these circumstances no useful purpose whatever would be served by giving the weights of the produce, though there are several points brought out in the report which are worth attention. There was only one instance in which an adequate return for the manuring was obtained, and that was when 4 cwts. of nitrate of soda were used alone. It was noticeable that the mangold plots with nitrate of soda continued growing for a longer period than those which had none. The rainfall for the year was 23.36 inches. It is intended to repeat these same experiments in 1889 with some modifications.

II.—NORFOLK CHAMBER OF AGRICULTURE.

The name of Mr. F. I. Cooke is now so well known in connection with the careful carrying out of practical experimental trials that it is no surprise to find that the Annual Report of the Norfolk Chamber contains the record of even more extended investigations than before. Besides Mr. Garrett Taylor and Mr. Sapwell, who have from the beginning been associated with Mr. Cooke, two other gentlemen, Mr. C. L. Buxton of Bolwick, and Mr. G. J. Holmes of Brooke, have recently placed land at the disposal of the Managing Committee for experimental purposes, so that now the Chamber may be said to possess no less than six "stations." It becomes in consequence more and more difficult to do even ordinary justice in an abstract of this kind, and the readiest and best way would undoubtedly be to refer readers to the Report of the Chamber, containing the full account of the experiments of the year. Mr. Cooke, indeed, not satisfied with what may be termed the ordinary "practical farmers'" experiments, has now, in one or two instances, extended these in the direction of scientific inquiry, a subject with which he is, I may say, one of the very few "practical" men qualified to deal. The Norfolk Chamber, through their Experimental Committee, soon saw the absolute necessity of an efficient superintendent, whose special duty it should be to watch the experiments and be responsible for the carrying out of the directions of the committee. They may, I have reason to know, be congratulated on obtaining a man who, after some careful preliminary training, has become very efficient for the post.

Despite every care and precaution, however, experiments are subservient to season, and the remarkable year just passed has played havoc with many of the trials. The almost entire absence of sun has perhaps most of all prevented the different manures from working their proper effects.

The main field experiment was one upon wheat, following rotation seeds, the object being to find what, in the absence of farmyard manure, would be the most suitable dressing to apply for wheat. This would meet, it was hoped, the case of entering on a new occupancy, or of not having a sufficient supply of dung.

Whitlingham, Cawston, and Flitcham were the places where the experiment was carried out. The soils have been described in previous reports: at Whitlingham it is light and open, about nine inches of topsoil, with subsoil of brick-earth and clay; at Cawston it is five to six inches poor light surface land on sandy subsoil; and at Flitcham a very thin, light, and hungry topsoil resting on chalk.

Barley in each case preceded the seeds, which were sown among it, and not manured themselves before the wheat. The autumn sowings of sulphate of ammonia took place the end of September or beginning of October; the spring top-dressings of this and nitrate of soda the first week of April. All other manures were applied in September or October. The results are given in Table II. on page 292.

At Whitlingham the unmanured produce was on the average 23 bushels per acre, and even with the many kinds of artificials employed no greater increase than 4 bushels could be obtained—the best result being due to 4 cwts. of rape-cake in autumn and 1 cwt. of nitrate of soda in spring, the cost being about 26s. per acre.

The season was all against reliance on artificial manures alone, and, as seen from plot 13, a heavy dressing of dung used with artificials gave a much increased yield, though dung alone (plot 15) unaided by the nitrate of soda did only slightly better than the artificials.

The Flitcham results are much of the same character, with the exception of plots 4 and 5, on which 1 cwt. of muriate of potash was sown in autumn in addition to rape-cake.

Mr. Cooke writes of the appearance of these two plots by comparison with the others as being quite magical, and having inspected them myself, I also can speak to the very striking differences produced, and which on the facts and figures one cannot help attributing to the effect of the muriate of potash applied. Anyhow, the crops on these plots stood erect while all others lay nearly flat down, and they yielded fairly in comparison with the ordinary farming (plot 13), which included the use of ten loads of dung, as well as muriate of potash and nitrate of soda ($\frac{3}{4}$ cwt. each). Of the other plots the best was, as at Whitlingham, plot 9 (4 cwts. rape-cake in autumn, and 1 cwt. nitrate of soda in spring).

TABLE II.—WHEAT AFTER ROTATION SEEDS.

Plot	Manures per acre	Place of experiment	Produce per acre	
			Head-corn	Straw
			bushels	cwts. qrs. lbs.
1	Nothing	Whitlingham	22-25	16 1 16
		Cawston . .	22-15	15 2 0
		Flitcham . .	10-23	10 1 22
2	4 cwts. rape-cake (sown in autumn) . .	Whitlingham	25-25	17 0 12
		Cawston . .	22-65	16 0 16
		Flitcham . .	14-06	11 3 24
3	{ 1 cwt. sulphate ammonia (sown in autumn before ploughing) . . .	Whitlingham	25-50	19 0 0
		Cawston . .	24-18	16 1 16
		Flitcham . .	12-81	11 2 7
3A	{ 1 cwt. sulphate ammonia (sown in autumn after ploughing)	Whitlingham	24-50	18 2 12
		Cawston . .	21-50	16 1 8
		Flitcham . .	12-81	11 2 7
4	{ 4 cwts. rape-cake 1 cwt. muriate of potash (sown in autumn)	Whitlingham	24-53	16 3 4
		Cawston . .	29-37	21 2 22
		Flitcham . .	23-59	16 2 17
5	{ 4 cwts. rape-cake 2 „ superphosphate 1 „ muriate of potash (sown in autumn)	Whitlingham	25-15	16 3 14
		Cawston . .	26-65	19 3 20
		Flitcham . .	23-75	17 1 23
6	{ 4 cwts. rape-cake 2 „ superphosphate (sown in autumn)	Whitlingham	22-57	15 2 24
		Cawston . .	25-81	18 3 18
		Flitcham . .	16-87	14 1 4
7	{ 1 cwt. sulphate ammonia (sown in autumn) 1 cwt. sulphate ammonia (sown in spring)	Whitlingham	25-62	17 2 0
		Cawston . .	24-25	18 2 4
		Flitcham . .	12-18	10 3 16
8	{ 1 cwt. sulphate ammonia (sown in autumn) 1 cwt. nitrate of soda (sown in spring)	Whitlingham	25-25	16 3 20
		Cawston . .	23 50	18 2 6
		Flitcham . .	15-07	12 3 22
9	{ 4 cwts. rape-cake (sown in autumn) 1 cwt. nitrate of soda (sown in spring)	Whitlingham	27-34	19 3 8
		Cawston . .	29-25	24 2 18
		Flitcham . .	18-82	15 2 14
10	8 cwts. rape-cake (sown in autumn) . .	Whitlingham	24-14	15 2 9
		Cawston . .	25-34	20 0 20
		Flitcham . .	14-21	11 3 24
11	{ 2 cwts. sulphate ammonia (sown in autumn before ploughing)	Whitlingham	25-00	16 1 4
		Cawston . .	19-81	14 1 20
		Flitcham . .	12-73	10 3 26
11A	{ 2 cwts. sulphate ammonia (sown in autumn after ploughing)	Whitlingham	26-00	17 3 20
		Cawston . .	21-75	18 0 4
		Flitcham . .	12-73	10 3 26
12	Nothing	Whitlingham	23-90	15 2 9
		Cawston . .	22-37	18 0 4
		Flitcham . .	15-00	12 0 21
13 Ordinary Farming.	{ 15 loads dung 3 cwts. salt $\frac{1}{2}$ cwt. nitrate of soda	Whitlingham	33-75	23 3 16
		Whitlingham	29-53	17 3 12
		Whitlingham	29-53	17 3 12
14	{ 10 loads dung 3½ cwts. salt $\frac{1}{2}$ cwt. nitrate of soda	Whitlingham	29-53	17 3 12
		Cawston . .	37-50	29 0 12
		Cawston . .	37-50	29 0 12
13	{ 10 loads dung, and in February 3 cwt. nitrate of soda $\frac{1}{2}$ „ muriate of potash	Whitlingham	23-90	15 2 9
		Cawston . .	22-37	18 0 4
		Flitcham . .	15-00	12 0 21
13	{ 10 loads dung, and in February 3 cwt. nitrate of soda $\frac{1}{2}$ „ muriate of potash	Whitlingham	23-90	15 2 9
		Cawston . .	22-37	18 0 4
		Flitcham . .	15-00	12 0 21
13	{ 10 loads dung, and in February 3 cwt. nitrate of soda $\frac{1}{2}$ „ muriate of potash	Whitlingham	23-90	15 2 9
		Cawston . .	22-37	18 0 4
		Flitcham . .	15-00	12 0 21

At Cawston the same dressing gave good results, and except by the ordinary farming (plot 13) was only equalled by rape-cake and muriate of potash (plot 4). The possible influence of the potash here is, however, discounted by the lower yield of plot 5, though this, like plot 4, had a more healthy appearance than the other plots. The ordinary farming with ten loads of dung, $3\frac{1}{2}$ cwt. of salt, and $\frac{3}{4}$ cwt. of nitrate of soda, gave a far higher return than the artificials.

Summarising the results, the need of farmyard manure in unpropitious seasons on the thin soils of Norfolk has been strongly brought out, though it is also clear that it may be most usefully supplemented. Nor would it appear that dung can be sufficiently replaced by artificial manures, at least in a season like 1888; nor by rape-cake, which, especially in Norfolk, has had many supporters, but which proved in these experiments very unsatisfactory.

*Experiments on Barley after Swedes drawn off the Land,
and also after Wheat, at Bolwick.*

These were in repetition of the experiments carried out at Whitlingham and Aylsham in previous years. A main point was to determine the value of a mixture in great local favour, viz. guano and salt, the salt being believed to strengthen the straw. Unfortunately, however, for this belief the salt plots were in each experiment decidedly the most beaten down of all the number. At the same time, the produce both of corn and straw was appreciably increased. This is a result not before obtained in these experiments, and whether due to an exceptional season or not is uncertain, but will form the basis of further inquiry in the future. The unmanured yield was very high, viz. $36\frac{1}{2}$ bushels after swedes, and 41 bushels after wheat, the land being evidently too good or in too high condition to bring out the influence of the manures.

Experiments at Flitcham on the Use of Potash in different forms.

Some of these continuations of former experiments have failed to throw any further light on the question. Mr. Cooke, indeed, says that, owing probably to the extensive use of potash manures in previous years, it is a matter of extreme difficulty to find now on his farm a spot on which the deficiency of potash is sufficiently marked to give the required results. One experiment, however, where white turnips, swedes, and barley were all sown on a small spot exceptionally deficient in potash, led to some interesting results, the white turnips flourishing, while the swedes and barley were both miserable crops.

TABLE III.—EXPERIMENTS UPON SWEDES AT WHITLINGHAM (MR. TAYLOR'S) AND DUPLICATED AT AYLSHAM (MR. SAPWELL'S).

Previous crop of Wheat at Whitlingham was manured with 15 loads of dung, and at Aylsham with 10 loads of dung, 2½ cwt. salt, ¾ cwt. nitrate of soda per acre.

Plot	Manures per acre	Place of experiment	Roots per acre	Tops per acre
			tons cwt. qrs. lbs.	tons cwt. qrs. lbs.
1	Nothing	Whitlingham	20 4 2 6	2 1 3 14
		Aylsham . .	13 17 3 2	1 9 3 8
2	{ 4 cwt. superphosphate, mixed with ½ cwt. bone-flour, 1 cwt. sulphate ammonia, 1 cwt. muriate of potash . . . }	Whitlingham	23 11 0 18	2 16 1 0
		Aylsham . .	21 9 0 12	1 17 3 2
3	{ 4 cwt. superphosphate, 1 cwt. sulphate ammonia, 1 cwt. muriate of potash }	Whitlingham	25 8 1 6	2 10 2 4
		Aylsham . .	23 4 1 24	1 19 2 26
4	{ 4 cwt. superphosphate, mixed with ½ cwt. bone-flour . . }	Whitlingham	21 8 0 14	2 4 0 2
		Aylsham . .	19 8 0 24	1 15 3 16
5	{ 4 cwt. superphosphate }	Whitlingham	24 7 2 20	2 7 0 26
		Aylsham . .	20 5 2 14	1 16 2 12
6	Nothing	Whitlingham	23 4 1 24	2 5 2 14
		Aylsham . .	15 18 0 14	—
7	{ 4 cwt. superphosphate, mixed with ½ cwt. bone-flour, 1 cwt. sulphate ammonia }	Whitlingham	25 17 3 22	2 10 3 6
		Aylsham . .	20 16 0 8	1 17 3 12
8	{ 4 cwt. dissolved bones }	Whitlingham	24 14 0 2	2 10 2 4
		Aylsham . .	18 17 3 2	—
9	{ 1½ cwt. guano, ½ cwt. bone-flour, 4 cwt. superphosphate . . }	Aylsham . .	18 1 2 22	—

This experiment was conducted mainly for the purpose of seeing whether the free acid in mineral superphosphates had, as asserted in some quarters, an injurious effect on the swede crop, in the case of land (as here) somewhat deficient in lime, and whether the use of bone-flour, to neutralise its action, would prevent any evil effects. The first year (1886) the addition of bone-flour seemed to produce at Whitlingham a striking influence; but there was very little, if any, confirmation of this in subsequent experiments, and the results now recorded, and in which exceptionally acid manures were purposely used, may be taken as abundantly showing that practically no injury has been done by the acid superphosphate, nor any gain obtained by mixing it with a little bone-flour.

The Report of the Committee contains the account of many more experiments, *e.g.* on mangolds and on rotation seeds—into which space does not allow me to enter—besides an extensive one on sheep-feeding, carried out at Whitlingham. Altogether, the report is a record of a very busy and very useful year of experiment, and will well repay study.

III.—THE ROYAL MANCHESTER LIVERPOOL AND NORTH LANCASHIRE AGRICULTURAL SOCIETY.

The experiments of this society, upon the laying down of grass for permanent pasture, and also for ley of one to four years' duration, have been continued at the two stations, Saltney near Chester, and Rostherne (Lord Egerton of Tatton's).

At Saltney, it may be remembered that the experiments on rotation grasses for one year's ley resulted in 1887 in favour of a simple mixture such as that used on plot 14, *viz.* 22 lbs. Italian ryegrass, and 10 lbs. American red clover.

The experiments on two and three years' ley were continued, and not only were the yields weighed as hay, but the hay was examined by Mr. Smetham, the Society's chemist, and the dry matter in it determined, so as to enable fair comparison. The following Table (IV.) gives the yields in 1888, the dry matter of the crops of 1887 and 1888, as also the total dry matter for the two years:—

TABLE IV.

		Weight of hay in 1888	Dry matter per acre in 1887	Dry matter in 1888	Total for two years
		Cwts. qrs. lbs.	Cwts. qrs. lbs.	Cwts. qrs. lbs.	Cwts. qrs. lbs.
Three years' ley, plot 6		33 0 0	34 1 0	22 0 22	56 1 22
" " " 7		36 0 0	39 0 0	25 1 9	64 1 9
Two years' ley, plot 8		35 0 0	38 0 0	24 0 9	62 0 9
" " " 9		40 0 0	41 2 0	28 0 22	69 2 22
" " " 10		27 0 0	40 0 0	18 0 12	58 0 12
" " " 11		32 0 0	43 1 0	22 3 10	66 0 10

The best result for two years' ley is accordingly given by plot 9, the seeding of which per acre was as follows:—

4 lbs. Italian ryegrass
4 lbs. Perennial ryegrass
4 lbs. Cocksfoot
3 lbs. Meadow fescue
2 lbs. Timothy

4 lbs. Cowgrass
2 lbs. White clover
2 lbs. Alsike
1 lb. Trefoil

In the plots for three years' ley, plot 7 has maintained the superiority shown over plot 6 in 1887. The respective seedings of these plots are:—

PLOT 6.

4 lbs. Italian ryegrass
 6 lbs. Cocksfoot
 3 lbs. Meadow fescue
 2 lbs. Tall fescue
 2 lbs. Meadow fescue
 3 lbs. Timothy
 3 lbs. Red clover
 1½ lb. White clover
 1½ lb. Alsike

PLOT 7.

2 lbs. Italian ryegrass
 5 lbs. Perennial ryegrass
 5 lbs. Cocksfoot
 3 lbs. Meadow fescue
 2 lbs. Meadow foxtail
 1 lb. Hard fescue
 2 lbs. Timothy
 1 lb. Crested dogstail
 4 lbs. Cowgrass
 1½ lb. White clover
 1½ lb. Alsike

The diminished produce in 1888 as compared with 1887 is noticeable, although the season was distinctly more favourable for grass. Mr. Holland, the Society's botanist, remarks on the deterioration of Italian ryegrass and red clover (biennials) on the rotation plots, but adds that their place seems to have been taken by other grasses. Plots 6 and 7 (three years' ley) would both readily stand for permanent pastures, and probably be much better than many of the ordinary mixtures sown by farmers. Of the permanent pasture plots at Saltney (plots 1-5), all have made good progress, and there are no signs of a deterioration. At present it is difficult to say which is the best. Plot No. 1, a cheap mixture, consisting of

24 lbs. Devonshire evergreen ryegrass
 4 lbs. Crested dogstail

4 lbs. Wild white clover
 ½ lb. Sweet vernal grass,

has formed a wonderfully close root, and is literally one mass of white clover. Mr. Holland thinks the seed sold as "Wild" white clover has produced a plant of smaller character, but with greater power of spreading than clover from ordinary white clover seed. He also thinks the plot shows the Devonshire Evergreen Ryegrass to be a special strain of dwarfer nature, but with more spreading habit than other strains of ryegrass. Both Yarrow and Birdsfoot Trefoil are spreading largely on the plots where they were sown. Mr. Holland's report contains further notes on specimen plots of individual grasses and the appearances presented by them.

At Rostherne, the experiments have been continued on the laying down of permanent pasture and for two and four years' ley. The dry season of 1887 caused the seeds sown that spring not to come up well; indeed, it was intended at one time to plough the plots up, but by April 1888 they had much improved, and, a wet season following, it appeared that a considerable number of the seeds which had been lying dormant came up, and the

plots were retained. The seeding with a wheat crop looked, on the whole, better than that with an oat crop. It is still premature to compare the various plots, but the following Table (V.) shows the weight of hay carried, and the dry matter yielded per acre :—

TABLE V.

	Seeds sown with wheat			Seeds sown with oats	
	Weight of hay per acre	Weight of dry matter per acre		Weight of hay per acre	Weight of dry matter per acre
	Cwts. qrs. lbs.	Cwts. qrs. lbs.		Cwts. qrs. lbs.	Cwts. qrs. lbs.
Plot A.	47 0 0	34 2 14	Plot L.	30 0 0	23 0 0
" B.	31 0 0	24 1 4	" K.	29 0 0	21 2 22
" C.	38 0 0	28 3 14	" J.	33 2 0	25 0 1
" D.	34 2 0	27 0 19	" I.	33 0 0	25 0 10
" E.	39 0 0	29 2 15	" H.	34 0 0	25 1 26
" F.	32 0 0	25 1 14	" G.	30 2 0	23 2 16
" M.	26 0 0	20 0 0	" N.	28 0 0	21 1 15

					Cost per acre	
					s.	d.
Plots A and L are for permanent pasture without ryegrass					43	10
" B	" K	"	"	with	31	7
" C	" J	" 4 years' ley	"	without	30	6
" D	" I	"	"	with	25	1
" E	" H	" 2 years' ley	"	without	13	8
" F	" G	"	"	with	17	3
" M	" N	a mixture in local repute for 3 years' ley		"	17	4

The plots have, in 1888, been divided, one half being mown and the other half fed off.

It is gratifying to add, by way of conclusion, that the three Societies whose valuable experiments are here recorded, have undertaken to continue them in conjunction with the Royal Agricultural Society of England during the forthcoming season of 1889.

XIV.—*Report on the Field Experiments at Woburn, conducted on behalf of the Royal Agricultural Society of England during the year 1888.* By Dr. J. AUGUSTUS VOELCKER, B.A., B.Sc., Consulting Chemist to the Society.

EXPERIMENTS ON THE CONTINUOUS GROWTH OF WHEAT.

AFTER removal of the wheat crop of 1887, and subsequent ploughing and preparation of the land, wheat was again sown, this being the twelfth successive season. As usual 9 pecks per acre of seed were used, this being dibbled in October 13–15,

1887. Mineral manures were harrowed in on plots 4, 5, 6, 8, and 9, on October 17. The dung for plot 11B was made in the feeding boxes by four bullocks, which fed from November 24 to December 15 on 30 cwts. of swedes, 2 cwts. 2 qrs. decorticated cotton-cake, 4 cwts. of maize-meal, and 5 cwts. of wheat-straw chaff, being supplied during the time with 12 cwts. of wheat-straw as litter.

The dung after being made was clamped and kept in a shed until March 20, when it was weighed. The total weight was 24 cwts. 1 qr. 7 lbs. To plot 11B, 15 cwts. 1 qr. 6 lbs. was applied, this being the calculated quantity (from the composition of the foods and litter employed) required to supply ammonia to plot 11B at the rate of 200 lbs. per acre. The experience of previous years having gone to show that farmyard manure supplying ammonia at the rate of 100 lbs. per acre produced little or no effect on the crops of either wheat or barley, it was decided to leave the plots 10B unmanured this season, and in the following one to try instead rape-cake, supplying ammonia at the same rate per acre. The nitrogenous top-dressings of nitrate of soda and ammonia-salts (sulphate of ammonia and muriate of ammonia in equal parts) were put on plots 2, 3, 5, 6, 8B, and 9B on May 5. A fortnight later the nitrate of soda began to show its effect, and the ammonia-salts a few days after.

But little need be said to recall the exceptionally unfavourable season, the heavy and continuous rains which did so much damage to corn crops, and perhaps worst of all, the almost total absence of sun and warmth so much required to ripen the grain. Under such circumstances it is not surprising that when after a very late harvest the corn was cut September 4-7, carted and stacked on September 14, and the produce thrashed and weighed on November 22, it was found to be very small. The rainfall during the year was 23.94 inches, as against 15.04 inches in 1887, and in the month of July alone it was no less than 4.96 inches. *Puparia* of the Hessian fly were found on the plots, but the damage done, if any, was very slight. The results of the harvest are given in Table I. opposite. The produce of corn was very similar to that of 1886, also a very wet year (the rainfall then being 25.05 inches), but the yield of straw was considerably larger. The weight per bushel of the corn was exceptionally small—indeed, we have to go back to 1880 to find a parallel.

Minerals used alone gave only as much as the average yield of the unmanured plots. Nitrate of soda supplying 50 lbs. ammonia, when used alone produced 3 bushels an acre more corn and 2 cwt. more of straw than ammonia-salts, supplying

TABLE I.—PRODUCE OF CONTINUOUS WHEAT. TWELFTH SEASON, 1888.

PLOTS	MANURES PER ACRE	PRODUCE PER ACRE			
		Dressed Corn			Straw, Chaff, &c.
		Weight	Number of Bushels	Weight per Bushel	
		lbs.		lbs.	cwts. qrs. lbs.
1	Unmanured	669	12·5	53·4	13 0 20
2	{ 200 lbs. ammonia-salts, containing 50 lbs. ammonia }	893	17·1	52·1	19 3 16
3	{ 275 lbs. nitrate of soda, containing nitrogen = 50 lbs. ammonia }	963	20·0	48·05	21 3 15
4	{ 200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, $3\frac{1}{2}$ cwts. superphosphate of lime }	603	11·2	53·75	15 1 6
5	{ 200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, $3\frac{1}{2}$ cwts. superphosphate of lime, and 200 lbs. ammonia-salts }	1,352	24·2	55·95	23 1 19
6	{ 200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, $3\frac{1}{2}$ cwts. superphosphate of lime, and 275 lbs. nitrate of soda }	1,618	30·6	52·8	30 2 2
7	Unmanured	475	9·4	50·5	14 0 21
8A	{ 200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, $3\frac{1}{2}$ cwts. superphosphate of lime }	1,056	18·5	57·1	19 1 4
8B	{ The same minerals as in 8A, and 400 lbs. ammonia-salts }	1,590	29·6	53·8	37 2 0
9A	{ 200 lbs. sulph. potash, 100 lbs. sulph. soda, 100 lbs. sulph. magnesia, $3\frac{1}{2}$ cwts. superphosphate of lime }	684	12·3	55·75	13 1 26
9B	{ The same minerals as in 9A, and 550 lbs. nitrate of soda }	1,508	30·0	50·2	36 3 22
10A	{ No manure (having received manure as 10B in each of the five seasons previous to 1882, but none in 1882 or since) }	686	12·9	53·0	14 2 20
10B	{ Farmyard-manure, estimated to con- tain nitrogen = 100 lbs. ammonia, made from 672 lbs. decorticated cotton-cake, 1,075 lbs. maize-meal, 8,064 lbs. turnips, 1,344 lbs. wheat- straw, as food; and 3,174 lbs. wheat- straw as litter. Weight about 4 tons. Applied each year up to 1888, but none that year. }	934	16·6	56·25	17 1 24
11A	{ No manure (having received manure as 11B in each of the five seasons previous to 1882, but none in 1882 or since) }	826	15·2	54·5	14 3 18
11B	{ Farmyard-manure, estimated to con- tain nitrogen = 200 lbs. ammonia, made from 1,344 lbs. decorticated cotton-cake, 2,150 lbs. maize-meal, 16,128 lbs. turnips, 2,688 lbs. wheat- straw chaff, as food; and 6,348 lbs. wheat-straw as litter. Weight about 8 tons }	1,336	23·2	57·5	22 2 10

the same ammonia, and the same used in conjunction with minerals gave an increase of 6.4 bushels of corn and 7 cwts. of straw in favour of nitrate of soda. When, however, double the amount of ammonia was given in the two forms along with the same minerals, the differences whether in grain or straw were not appreciable. A striking point is brought out by the omission for a single year of the nitrogenous top-dressings (plots 8A and 9A), for while the produce of plot 9A (nitrate of soda) has at once gone down to that of the unmanured plot 1, the ammonia-salts applied last in 1887 have still continued to give an increase of 6 bushels of corn and 6 cwts. of straw. Last year also there was just about this same difference to note, and it has an important bearing on the question of residual nitrogen in the soil from previous manurings with these salts. In regard to the dung plots, 10A has gone down to the unmanured yield, and the 4 tons per acre applied last in 1887 have only given 4 bushels of increase. The application of 8 tons per acre has, however, yielded 11 bushels more corn and 9 cwts. more straw.

EXPERIMENTS ON THE CONTINUOUS GROWTH OF BARLEY.

The farmyard manure for plot 11B was made in the same way as that described in the case of the similar plot of the continuous wheat experiment. As previously noted, it was intended for application only to plot 11B, both 10A and 10B being left unmanured, in preparation for rape-cake to be substituted in 1889. It must be recorded, however, that the dung was in error applied to plot 11A instead of 11B, during the absence (through serious illness) of the able and most careful manager, Mr. Fraser.

The dung was ploughed in on March 31, and the barley—9 pecks per acre—and mineral manures were sown on April 4. The top-dressings of nitrate of soda and ammonia salts followed on May 8. Towards harvest *puparia* of Hessian fly were found on the plots, but, as in the case of the wheat, the damage was very slight indeed. The wet weather and absence of sunshine delayed harvest till very late, but the crop was finally got up on September 12, and the produce was thrashed and weighed on November 24.

The results are given in Table II. opposite.

The barley crop did not suffer to nearly the same extent as the wheat, and the general yield of the plots in corn is about the same, or slightly above the mean of the ten years 1877–1886. The straw is, however, less in quantity. Mineral manures alone have given about $2\frac{1}{2}$ bushels of corn increase. Ammonia salts

TABLE II.—PRODUCE OF CONTINUOUS BARLEY. TWELFTH SEASON, 1888.

PLOTS	MANURES PER ACRE	PRODUCE PER ACRE			
		Dressed Corn			Straw, Chaff, &c.
		Weight	Number of Bushels	Weight per Bushel	
		lbs.		lbs.	cwts. qrs. lbs.
1	Unmanured	923	18.55	49.75	10 3 27
2	{ 200 lbs. ammonia-salts, containing 50 lbs. ammonia }	2,215	42.7	51.9	23 1 26
3	{ 275 lbs. nitrate of soda, containing nitrogen = 50 lbs. ammonia }	1,928	37.3	51.7	22 1 3
4	{ 200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. magnesia, 3½ cwts. superphosphate of lime }	1,028	20.1	51.2	10 0 3
5	{ 200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwts. superphosphate of lime, and 200 lbs. ammonia-salts }	2,449	46.3	52.84	24 1 15
6	{ 200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwts. of superphosphate of lime, and 275 lbs. nitrate of soda }	2,433	45.4	53.6	25 3 4
7	Unmanured	842	16.5	51.1	8 1 4
8A	{ 200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwts. of superphosphate of lime }	1,858	36.3	51.2	20 0 26
8B	{ The same minerals as in 8A, and 400 lbs. ammonia-salts }	2,644	53.2	49.75	30 2 22
9A	{ 200 lbs. sulph. of potash, 100 lbs. sulph. of soda, 100 lbs. sulph. of magnesia, 3½ cwts. of superphosphate of lime }	1,508	28.2	53.5	14 0 16
9B	{ The same minerals as in 9A, and 550 lbs. of nitrate of soda }	2,454	49.0	50.04	29 3 26
10A	{ No manure (having received manure as 10B in each of the five seasons previous to 1882, but none in 1882 or since) }	1,272	24.7	51.5	14 2 20
10B	{ Farmyard-manure, estimated to con- tain nitrogen = 100 lbs. of ammonia, made from 672 lbs. decorticated cotton-cake, 1,075 lbs. maize-meal, 8,064 lbs. turnips, 1,344 lbs. wheat- straw chaff, as food; and 3,174 lbs. wheat-straw as litter. Weight about 4 tons. Applied each year up to 1888, but none that year }	1,264	24.3	52.0	14 0 16
11A ¹	{ No manure (having received manure as 11B in each of the five seasons previous to 1882, but none in 1882 or since) }	1,922	36.2	53.06	19 1 12
11B ²	{ Farmyard-manure, estimated to con- tain nitrogen = 200 lbs. ammonia, made from 1,344 lbs. decorticated cotton-cake, 2,150 lbs. maize-meal, 16,128 lbs. turnips, 2,688 lbs. wheat- straw chaff, as food; and 6,348 lbs. wheat-straw as litter. Weight about 8 tons }	1,504	28.1	53.5	15 1 14

¹ Applied in error this year, as in 11B.

² Omitted in error this year.

(ammonia 50 lbs. per acre) have shown a surprisingly good yield, the best since 1884, and a better one by 5 bushels than with nitrate of soda (also 50 lbs. ammonia per acre) alone. Mineral manures added to these salts gave in either case nearly equal results and an increase of 4 and 8 bushels respectively. Doubling the quantity of ammonia has produced with the same minerals 7 bushels more in the case of ammonia-salts, and 3·6 bushels more in that of nitrate of soda, the greater quantity of straw being obtained also with the ammonia-salts. The latter have, therefore, this season given better results throughout than nitrate of soda.

When we come to examine the plots 8A and 9A, where the top-dressings have been omitted for a single year, we see very strikingly the residual effect of both kinds of salts, and also the differences between the wheat and barley crop in this respect; for, while the produce of wheat has gone down in a single year to the level of the unmanured land by the withholding of nitrate of soda for that year, barley under similar conditions still shows an increased yield of 10 bushels of grain and $3\frac{1}{4}$ cwt. of straw. Further than this, the residue even from nitrate of soda would, in the case of barley, appear to be a yearly increasing one. Still more is this the case with ammonia-salts, which, though omitted for the year, are still capable of doubling the unmanured produce, and giving, as with wheat, a residue considerably in excess of that from nitrate of soda. The consideration of this subject is one of the deepest interest, as bearing both on the relative action of these salts and on their respective conservation in the soil by crops differing themselves in nature. As a single illustration it may be observed that the increase of barley due to the residue from ammonia-salts applied last in 1887 is equivalent to that produced by an application of 275 lbs. nitrate of soda (50 lbs. ammonia) per acre in the year of growth.

THE ROTATION EXPERIMENTS.

These experiments have been continued on the lines laid down in previous reports, the main object being by the growing, on one half of each rotation, of crops without manure and their entire removal off the land, to exhaust any previously overdue fertility, and by moderate manurings at intervals only to continue on the other half the cropping as before.

Rotation I.—Four acres. 1885, tares (2 acres); peas (2 acres); 1886, wheat; 1887, swedes; 1888, barley.

The yield of swedes in 1887 on the eight half-acre plots did not differ very largely, but was small, viz. between 9 and 11

tons per acre. A portion (at the rate of 6 tons per acre) was carted off each plot of the upper half (plots 1, 2, 3, 4,) and the remainder fed on the land by sheep with additional foods as follows:—

Plot 1 (half-acre)	.	.	.	with 200 lbs. decorticated cotton-cake
" 2	"	.	.	" 200 lbs. maize-meal
" 3	"	.	.	" no purchased food
" 4	"	.	.	" " " "

A little wheat-straw chaff was given to the sheep, and plots 3 and 4 were manured later for barley with artificials equivalent to the cotton-cake and maize-meal dung respectively.

The swedes on the lower half (plots 5, 6, 7, and 8) were carted off entirely. Barley—8 pecks per acre—was drilled on April 1, the mineral manures being put on plots 3 and 4 on April 4, and the nitrogenous top-dressing (nitrate of soda) on May 8. On the latter date also broad clover—16 lbs. to the acre—was sown over all the plots. The barley was harvested September 8–12, and the results are given in Table III. on page 304.

It will be noticed at once that the produce of the manured plots, 1, 2, 3, and 4, was considerably higher than that of the unmanured, and that cotton-cake continued to give indications of marked superiority over maize-meal in the case of a barley crop following the feeding-off of roots. The superiority is more clearly pronounced than in last year's experiments, and it would certainly appear now that the investigations are tending in the right direction. The yields of the four unmanured plots are very nearly alike, and about five bushels in excess of the continuous barley plots manured with minerals only.

Rotation II.—Four acres. 1885, swedes (2 acres), mangolds (2 acres); 1886, barley; 1887, tares (2 acres), peas (2 acres); 1888, wheat.

The tares and peas in 1887 were both reaped, and wheat—8 pecks per acre—was drilled October 26 and 27. The crop—as in the continuous wheat experiments—suffered very much from the unfavourable season. The yield was low and shows no great differences in the plots, except that the yield after peas is rather higher than after tares.

The results are given in Table IV. on page 305.

Rotation III.—Four acres. 1886, tares (2 acres), peas (2 acres); 1887, wheat; 1888, swedes (2 acres), mangolds (2 acres).

The mangold seed—6 lbs. per acre—was drilled April 28, and the swede seed—3 lbs. per acre—on May 21, the latter with 3 cwts. per acre of mineral superphosphate. But small

TABLE III.—PRODUCE OF BARLEY IN 1888 (ROTATION No. 1), AFTER (a) SWEDES FED ON THE LAND,
(b) SWEDES CARTED OFF.

Plots ½-Acre	Manure	Produce per Acre—DRESSED CORN						Straw, Chaff, &c. per Acre
		Head-corn			Tail-corn			
		Weight	Bushels	Weight per Bushel	Weight	Bushels	Weight per Bushel	
1	After Swedes fed-off with cotton-cake . . .	cwts. qrs. lbs. 17 2 6	36.0	lbs. 54.6	cwts. qrs. lbs. 2 0 3½	5.1	lbs. 44.75	cwts. qrs. lbs. 24 0 12½
2	After Swedes fed-off with maize-meal . . .	16 1 22	33.6	54.8	1 1 3½	3.4	42.75	21 3 5½
3	{ After Swedes fed-off, and artificial equiva- { lent of cotton-cake dung	19 1 10½	39.8	54.4	2 0 2	5.2	43.75	26 3 11½
4	{ After Swedes fed-off, and artificial equiva- { lent of maize-meal dung	15 2 3	31.9	54.6	1 3 26	4.8	46.0	23 3 13
5	{ No manure (after swedes carted off— { cotton-cake plot)	12 1 20½	25.5	54.65	1 1 15	3.6	43.0	18 0 8
6	{ No manure (after swedes carted off— { maize-meal plot)	12 1 12	25.3	54.6	1 1 20	3.6	44.5	19 1 22½
7	{ No manure (after swedes carted off—arti- { ficial equivalent of cotton-cake dung)	13 0 0½	26.8	54.4	2 0 24½	5.4	46.25	21 3 2½
8	{ No manure (after swedes carted off—arti- { ficial equivalent of maize-meal dung)	12 1 3	25.3	54.4	1 1 13	3.4	45.0	22 1 10

TABLE IV.—PRODUCE OF WHEAT IN 1888 (ROTATION No. 2), AFTER (a) TARES, (b) PEAS.

Plots ½-Acre	Manures per Acre	Produce per Acre—DRESSED CORN								Straw, Chaff, &c. per Acre
		Head-corn			Tail-corn			Weight per Bushel	Bushels	lbs.
		Weight	Bushels	Weight per Bushel	Weight	Bushels	Weight per Bushel			
1	No manure (after tares—cotton-cake plot) .	cwts., qrs., lbs. 9 3 18	18·8	58·8	cwts., qrs., lbs. 1 0 20	3·0	43·5	cwts., qrs., lbs. 17 0 27		
2	No manure (after tares—maize-meal plot) .	10 0 14	19·3	58·75	0 2 18	2·1	34·75	17 2 4½		
3	No manure (after tares—artificial equivalent) { of cotton-cake dung}	9 3 13½	18·5	59·8	0 1 25	1·8	30·0	17 2 5½		
4	No manure (after tares—artificial equivalent) { of maize-meal dung}	9 2 24	18·4	59·2	0 2 23	2·1	37·5	16 3 16½		
5	No manure (after peas—cotton-cake plot) .	12 0 4	23·2	58·2	1 1 5	3·4	43·25	21 3 1½		
6	No manure (after peas—maize-meal plot) .	11 2 22	22·7	57·65	1 1 20	3·9	40·75	21 1 5		
7	No manure (after peas—artificial equivalent) { of cotton-cake dung}	10 1 1	20·1	57·2	1 2 11	4·4	41·1	19 0 27½		
8	No manure (after peas—artificial equivalent) { of maize-meal dung}	10 0 6½	19·5	57·7	1 3 2	4·8	41·25	18 2 18		

yields could of course be expected after three previous unmanured crops all carried off, but a very fairly even plant was obtained both with swedes and mangolds. The latter were pulled and weighed October 23 and 24, and the former December 17-21. The results are given in Table V. below, but do not admit of any definite conclusion being drawn from them as yet.

TABLE V.—PRODUCE OF SWEDES AND MANGOLDS IN 1888
(ROTATION NO. 3) AFTER WHEAT.

SWEDES.

PLOTS ½-Acre	Manure per acre	Produce per acre			
		Roots		Leaves	
		tons	cwts. qrs. lbs.	tons	cwts. qrs. lbs.
1	{ 3 cwt. superphosphate (after wheat —cotton-cake plot) }	8	9 0 16	1	7 2 16
2	{ 3 cwt. superphosphate (after wheat —maize-meal plot) }	8	19 2 16	1	8 2 10
3	{ 3 cwt. superphosphate (after wheat with artificial equivalent of cot- ton-cake dung) }	9	13 2 20	1	6 3 12
4	{ 3 cwt. superphosphate (after wheat with artificial equivalent of maize-meal dung) }	9	2 2 14	1	5 0 18

MANGOLDS.

5	{ No manure (after wheat—cotton- cake plot) }	8	8 3 12	3	7 1 18
6	{ No manure (after wheat—maize- meal plot) }	7	17 3 24	3	6 1 14
7	{ No manure (after wheat with artifi- cial equivalent of cotton-cake dung) }	9	17 0 3	3	8 3 12
8	{ No manure (after wheat with arti- ficial equivalent of maize-meal dung) }	8	9 0 20	3	2 2 12

Rotation IV.—Four acres. 1886, swedes (2 acres), mangolds (2 acres); 1887, barley; 1888, red clover.

Here, for the first time, under the altered conditions, was a crop of clover grown—tares and peas having taken its place in the three other rotations. Red clover seed—16 lbs. per acre—was shown among the barley of 1887 and came up well, looking very promising through the winter, but subsequently a great quantity of weeds (chiefly plantain) showed themselves in it. The clover was cut, carted, and weighed green on June 25, and the second cut August 10-11.

The results are given in the following Table (VI.) :—

TABLE VI.—PRODUCE OF CLOVER (WEIGHED GREEN) IN 1888
(ROTATION No. 4), AFTER BARLEY.

PLOTS of $\frac{1}{2}$ -Acre	Manures	Produce per acre			
		tons	cwts.	qrs.	lbs.
1	No manure (after barley—cotton-cake plot)	6	4	0	0
2	No manure (after barley—maize-meal plot)	7	8	3	10
3	No manure (after barley—artificial equivalent of cotton-cake dung)	8	7	1	12
4	No manure (after barley—artificial equivalent of maize-meal dung)	6	14	2	2
5	No manure (after barley—cotton-cake plot)	4	14	2	12
6	No manure (after barley—maize-meal plot)	4	14	2	8
7	No manure (after barley—artificial equivalent of cotton-cake dung)	3	11	3	24
8	No manure (after barley—artificial equivalent of maize-meal dung)	2	10	2	20

In consequence of the wet weather the clover could not be made into hay, and so was all weighed green.

The results obtained here point to a very marked increase in the yield of clover on the plots manured for barley as against the unmanured. This increase was very noticeable in the case of the preceding barley crop also.

FURTHER EXPERIMENTS ON THE COMPARATIVE MANURIAL VALUES OF DECORTICATED COTTON-CAKE AND MAIZE-MEAL, CONDUCTED IN LANSOME FIELD.

1885, barley (manured); 1886, broad clover; 1887, wheat; 1888, swedes.

In this experiment the manures are only applied once in the four-course rotation. The swedes were accordingly not manured. The seed—3 lbs. per acre—was sown on May 26. The roots were very necky on all the plots, and owing to the wet summer there was a great quantity of tops. The swedes were pulled, topped, and tailed, and afterwards weighed December 1 and 3. The results are given in Table VII., page 308.

Here for the fourth year in succession the best result has been obtained from the use of decorticated cotton-meal, applied direct as manure. Considering that this was put on as far back as 1885, the increase now shown is the more remarkable. As was observed in previous years, there is an evident disparity between the plots 1 and 4—the latter being better land in

TABLE VII.—PRODUCE OF SWEDES IN LANSOME FIELD
IN 1888, AFTER WHEAT.

Plots, ½-Acre	Manures used per acre for barley in 1885	Produce per acre	
		Roots	Leaves
		Tons cwt. qrs. lbs.	Tons cwt. qrs. lbs.
1	No manure	5 5 1 16	1 10 2 12
2	{ With dung made from 9 cwt. decorticated cotton-cake, 120 cwt. white turnips, 20 cwt. wheat-straw chaff, and 48 cwt. wheat-straw as litter; weight about 4 tons	7 13 1 16	2 1 0 20
3	{ With decorticated cotton-cake meal, pulped roots and wheat-straw chaff, containing the same amount of manurial constituents as the dung in No. 2, but applied direct to the land	12 8 3 8	2 11 0 0
4	No manure	8 16 0 0	1 18 0 12
5	{ With dung made from 9 cwt. maize-meal, 120 cwt. white turnips, 20 cwt. wheat-straw chaff, and 48 cwt. wheat-straw as litter; weight about 1 tons	7 9 3 0	1 15 0 8
6	{ With maize-meal, pulped roots, and wheat-straw chaff, containing the same amount of manurial constituents as the dung in No. 5, but applied direct to the land	6 14 0 0	1 6 1 12

rather a lower and deeper part of the field. Plot 1 more nearly represents the true unmanured produce.

In addition to the foregoing experiments there are other field ones in progress, viz.—

(a.) Experiments on clovers and grasses.

(b.) Experiments with permanent pastures.

Separate reports of these experiments are contributed to the Journal by the Consulting Botanist of the Society. (See page 25.)

Crawley Mill Farm is situated near Woburn, Bedfordshire; the soil is a very light reddish loam, about 9 inches deep, with a subsoil of almost pure sand.

RAINFALL AT WOBURN DURING 1888, TAKEN DAILY AT
CRAWLEY MILL FARM.

	Inches		Inches
January	55	July	4.96
February	1.35	August	2.03
March	2.30	September	1.16
April	2.12	October . . . . .	.75
May . . . . .	.97	November	3.84
June	2.32	December	1.59

Total rainfall in year 23.94

RAINFALL IN 1882, 1883, 1884, 1885, 1886, 1887, 1888.

—	1882	1883	1884	1885	1886	1887	1888
Inches. .	28·14	24·20	17·84	25·97	25·05	15·04	23·94

DURING THE HARVEST MONTHS OF AUGUST AND SEPTEMBER
THE RAINFALL WAS—

—	1883	1884	1885	1886	1887	1888
Inches	4·65	2·76	6·65	2·61	2·62	3·19

XV.—*Annual Report of the Royal Veterinary College on the Investigations conducted in 1888 for the Royal Agricultural Society.* By PROFESSOR G. T. BROWN, C.B., Principal of the College.

AT the commencement of last year the grant of 200*l.* per annum, which had formerly been given to the College for promoting the study of pathology in relation to the diseases of cattle, sheep, and swine, was renewed; and the College was thereby enabled to defray the cost of purchase and keep of diseased animals which were sent to the College by members of the Society and also by members of the veterinary profession. A portion of the grant was devoted to the prosecution of experimental inquiries in reference to certain affections of the animals of the farm, and another portion to the payment of expenses connected with special lectures and demonstrations on particular diseases of cattle, sheep, and swine. It may be observed that the extent to which scientific inquiries may be prosecuted in the direction indicated is only limited by the funds at the disposal of the College; and it will become apparent in the course of this report that many obscure points, having a distinct relation to the welfare of the live-stock of the farm, still require elucidation.

For the purpose of showing what work was done during the year, a short statement of the cases of diseases which were investigated is given; and it may be remarked that, although a far larger number of diseased cattle, sheep, and swine were received at the College during 1888 than had been admitted

in any previous year since the institution was founded, the number might have been extended considerably if a small proportion of the 10,000 members of the Society had felt sufficient interest in the matter to induce them to send to the College animals which were useless on the farm. Cases of obscure disease in cattle, sheep, and swine are common enough; the animals are marked out as "bad doers," nothing is known of the cause of the falling-off in condition, and, after the herdsman or shepherd has tried his traditional remedies in vain, the animal is finally killed and buried, or sold for a trifle to some wandering jobber, and a valuable case is lost.

For purposes of investigation it is far more useful to obtain possession of diseased animals which are known to be worth nothing beyond the value of their hides, than to receive a larger number of patients into the infirmary in the ordinary course of veterinary practice, for the obvious reason that these animals are to be cured and returned to their owners, while the former are available for critical inquiry into the nature of the disease and means of cure, and the final test of a post-mortem examination.

Farmers complain that veterinary surgeons are too exclusively devoted to the horse, and take but a languid interest in the maladies of the other animals of the farm. The charge is to some extent true, and no improvement can be hoped for until farmers will give the members of the veterinary profession opportunities of dealing with outbreaks of disease among cattle, sheep, and swine, equal to those which they are afforded in the case of the horse.

Members of the Society cannot better assist in carrying out the aims of the Veterinary Committee than by keeping the College well furnished with subjects for investigation, and they may rest assured that there has not been any lack of interest on the part of the students in taking advantage of the means which have recently been offered.

STATEMENT OF CASES OF DISEASED CATTLE, SHEEP, AND SWINE ADMITTED TO THE ROYAL VETERINARY COLLEGE IN 1888.

In January a very interesting case of a cow with advanced tuberculosis was purchased from a dairyman and brought to the College. The animal was extremely emaciated, being in fact what is known as "a waster" or "piner."

In April, three steers affected with the disease known as actinomyces were admitted.

In May, two calves suffering from rheumatic disease of joints (joint felon) were admitted. The affection was at first supposed

to be scrofula, but it subsequently, on post-mortem examination, proved to be rheumatic in its nature.

During the same month two bullocks with actinomycosis were admitted, and also a cow with tuberculosis in a very advanced stage, corresponding to the case which has been referred to. In both these cows the udders were affected with the disease.

In June, three cattle affected with actinomycosis were admitted, and a sheep with a peculiar form of abscess affecting the head chiefly.

In July, two other cases of actinomycosis were received, and a mare from Wiltshire affected with a disease which was said to be identical with a fatal disease of cattle referred to in another part of this report as occurring on a farm in Lincolnshire belonging to Sir John Astley (see page 318). The mare died from the disease which is occasionally very destructive to horses—viz. inflammation of the membranes of the brain and spinal cord (cerebro-spinal meningitis).

During October another case of actinomycosis was admitted, and also a remarkably interesting case of a bullock with disease of the membrane which invests the heart (pericarditis). All the symptoms which indicate this form of disease were present in a very marked form, and the animal lived long enough to enable all the advanced students to study the case thoroughly. Post-mortem examination proved that the disease, as was suspected, was due to the presence of a foreign body—a large pin, which had at some time been swallowed, had passed through the stomach and the walls of the diaphragm, and penetrated the pericardium as far as the surface of the heart.

In November, a cow was admitted with disease of the udder (garget), and two sheep affected with “gid” (hydatids); also four lambs with “husk,” due to the presence of thread-worms in the tubes of the lungs. The animals were obtained for the purpose of studying the life-history of the worm strongle, which will be further considered.

In December, another case of actinomycosis was received, and a cow with tuberculosis, and two pigs which were suspected to have the same disease from drinking the milk of diseased cows; also six sheep with hydatids in the brain.

The total number of cases received was as follows:—

	Cases
Actinomycosis	12
Rheumatic disease joints	3
Tuberculosis	3
Chronic abscess	1
Hydatids in brain	8
Strongles in lungs	4
Suspected tuberculosis in swine	2

INQUIRIES INTO OUTBREAKS OF DISEASE AMONG CATTLE, SHEEP, AND SWINE, CONDUCTED BY THE OFFICERS OF THE COLLEGE IN DIFFERENT PARTS OF THE COUNTRY.

In February 1888 an outbreak of a fatal disease occurred among the experimental animals at Woburn. Prof. Axe investigated the case, which is thus stated by Dr. Voelcker, under whose direction the feeding experiments at Woburn were conducted:—

Among four beasts in an open yard ringworm broke out, one beast suffering in particular. This made them rather low, and they did not all feed well. While in this condition, two of them, Nos. 14 and 16, were attacked on February 12 by an illness, the nature of which could not be found out. They lingered for a considerable time, refused their food, and appeared to be in great pain. On February 20 the first one (No. 16) died, and, the local veterinary surgeon not being able to state the cause of death, parts of the animal were sent to the Royal Veterinary College for examination by Prof. Wortley Axe. Some long time had, however, elapsed before they could be examined, and they were then too stale. Prof. Axe himself visited the farm on February 22, and ordered the second bullock to be carefully watched, and, should it die, parts of it to be at once sent to him. The poor beast suffered greatly, so much so indeed that the humane feelings of the attendant induced him on February 29 to give it relief from its pain by a friendly blow, and the necessary parts were forwarded for investigation as before. It may be mentioned that it was feared that anthrax had broken out; but whether this was the case could not be ascertained, for it transpired that the humane blow struck had prevented the appearance of the very organisms which would have been recognisable in the case of anthrax had the animal been allowed to die naturally. Thus the outbreak, whatever it was, was not traced to its cause. Whether the food was unsuited to the animals or not is also uncertain; under ordinary circumstances the best thing to do would probably have been to change the food, but this was not possible in an experiment.

As Dr. Voelcker suggests, the considerate act which deprived the beast of life in all probability prevented the detection of the anthrax organism, if anthrax really existed—as the bacilli are not found as a rule till after an animal has *died* of the disease, and it appears from careful experiments that they are not developed until a short time before death in any case. No further outbreaks occurred among the remaining bullocks, and they were fed up to the time of slaughter.

In April, a member of the Society requested advice in regard to an obscure form of disease in his herd. Prof. Axe was instructed to visit the place and investigate the outbreak. He reported that the disease was actinomycosis, an affection which is very prevalent in certain districts, as will be explained in the course of this report. Prof. Axe advised that the remaining animals, which were healthy, should be removed from the park and disposed of as soon as possible.

In the latter part of April the advice of the veterinary officers of the Society was requested in regard to an outbreak of a very fatal form of diarrhoea among calves on a farm in Sussex. The circumstances of the outbreak were remarkable, and an inquiry resulted in the discovery of several possible causes of the disease.

Calves of a particular breed (Jerseys) suffered most. Those also from heifers were more severely attacked than were those of older animals. At different times the malady seemed to be associated with the use of peat-moss manure; then with the presence of the Stinking Chamomile and a variety of Bryony; and subsequently with the use of fowl-manure; and throughout the prominent fact occurred that all the affected calves had been dropped at a particular point on the farm. This fact, however, lost all significance when it was ascertained that all cows were sent to that place to calve. Prof. Axe, after an exhaustive inquiry in this case, made the following report:—

Commencement and Progress of the Disease.—The disease commenced about January 27 in the calf of a Kerry cow located with others at a farm situated at the extreme south of the estate, and to which all the cows as they dried off were sent to be “calved down.” The next case occurred in the calf of a dairy shorthorn on February 7, and thenceforward the disease continued to show itself first in one breed and then in another until the progeny of all the several breeds had suffered without exception. The offspring of the youngest as of the oldest cows were alike affected.

Of the 43 cows whose produce died, the period of gestation was completed in 36. Premature birth occurred in 4, and 3 brought forth dead calves. All the calves presented a plump well-nourished appearance at birth; but, as the herdsman expressed it, “they were born with a cold on them”—i.e. they discharged from the nostrils a glairy mucus, and sneezed and snuffled as if so suffering.

At this time the body temperature was not taken in any of them. We are therefore not able to affirm the existence of fever; but it is quite clear that the disease, whatever its nature may have been, was contracted *in utero*, and was not dependent for its existence upon the direct action of outside causes upon the foetus after birth.

Symptoms.—At birth the calves appear dull, and, although plump and well-nourished, do not display the life and activity of health. There is frequently at this time a discharge of sticky mucus from the nose, and frequent acts of sneezing and snuffling. A similar deflexion occurs from the eyes, and the mouth is hot and clammy. The muffle soon becomes dry, the eyelids droop, and the animal becomes dull and listless and presents a heavy sleepy appearance. For a short time after birth the faeces are natural. Sooner or later scouring sets in, when the discharges are frequently emitted and give off a pungent, sour, offensive odour. At first they present the yellow hue of health, but they soon become mixed with blood and changed to a chocolate colour. They are from the first largely impregnated with mucus, which hangs in long slimy strings from the anus. The last portion of each stool is expelled with pain during a loud plaintive moan. Abdominal pain is further shown by the firmly clenched jaws, grinding the teeth, and the repeated contraction or twitching of the abdominal muscles. In the

course of the disease the animal occupies the recumbent posture, with the head turned towards the flank. The breathing is somewhat quickened, and a prolonged grunt is emitted with each expiration. The expression of the face soon becomes dull and anxious, there is a discharge of saliva from the mouth, the coat stares, the skin is sensitive, and great prostration is shown by knuckling over of the hind fetlock joints and trailing the limbs. The temperature varies from day to day, as shown by the following Table:—

Date	No. 1. Bull Calf	No. 2. Bull Calf	No. 3. Cow Calf
May 21.	102°	102°	102°
" 22.	103°	104°	102 ³ / ₅ °
" 23.	103 ¹ / ₅ °	104 ³ / ₅ °	102°
" 24.	102 ³ / ₅ °	103 ³ / ₅ °	103 ² / ₅ °
" 25.	102°	104 ³ / ₅ °	103°
" 26.	101°	104 ³ / ₅ °	102 ³ / ₅ °
" 27.	102 ² / ₅ °	102 ³ / ₅ °	102 ⁵ / ₅ °

The vagina is red and congested, and the fæcal discharges excoriate the thighs. There is considerable weakness across the loins, and the hair falls off the neck and quarters. Paroxysms of abdominal pain are followed by intervals of ease.

Facts relating to Use of Peat.—German peat-moss litter is used largely, and the manure from the sheds, &c., where it is in use is distributed daily upon grass-land. When the calves were attacked, it was thought that perhaps the heavy dressings of this manure might have affected the cows. In order fully to test this, a small paddock was manured with an extra heavy dose, and as soon as the grass began to show through (about a week) three down-calving cows were put into the paddock and kept there until they calved. The calves were perfectly healthy and remained so.

Facts relating to Use of Fowl-Manure.—There is a large fowl-house on the farm, holding 80 to 100 fowls. Peat-moss is used in the fowl-houses, and when this had to be renewed the manure that was removed had been up to the time of the outbreak spread upon a grass paddock into which the in-calf cows were placed, in turn with other paddocks. But as the particular piece of land upon which the fowl-manure was spread is very dry and sheltered, and open only to the south, the cows, in cold weather, were turned out there more frequently than anywhere else.

Facts relating to Bryonia.—In the same paddock on which the fowl-manure was used, some old hedge-banks had been removed. In all the banks in the neighbourhood *Bryonia* is a common plant. The roots of Bryony are found at a very great depth below the surface, and therefore the removal of the banks did not kill the roots, and the plant was found growing on all the places from which hedges had been removed. A very common weed which flourishes on all waste spots is the Stinking Chamomile (*Matricaria chamomilla*). Cattle do not touch this plant when at its full growth; it is a question, however, whether in the early spring, when the plant first appears, cattle glad to get a bit of fresh green food may not nibble it; but we have no proof that they do, or that, if they do, they or their calves would suffer. This cannot be ascertained until the plant again commences to grow.

Health of Cows.—At the time when the outbreak in question arose in the calves, and during its progress up to the date of the inspection, none of the cows whose calves had suffered from the disease had been in the least out of health.

This opinion, formed from general observation, was confirmed by the

abundant yield and the uniformly rich quality of milk each of them afforded after parturition, and by the manner in which that supply was subsequently kept up.

It is a part of the system to weigh the daily produce of each cow, and to submit the milk of all of them to a periodical analysis: so that, the milk-producing capability of each animal being known, any departure from the quantitative or qualitative standard would have been recognised at once. As no change in these respects was observed in any of the cows, it may be inferred that their general health remained undisturbed, while the calves which they carried were unquestionably ailing at birth.

Food of Cows.—The main foodstuffs on which the several sets of cows were fed were drawn from the same stock, and appeared to be sweet and sound. They comprised linseed- and cotton-cake, oatmeal, hay and oat-straw with bran. From the end of February they also received a few mangolds and swedes. Some of the cows received among other things the out-sides of the silage slacks, which were first broken in November, and also unconsumed food removed from the sheds where the milking cows are kept.

While in milk the cows receive, in addition to the above, an allowance of wheat or pea-meal, with about one peck of grains and two oz. of salt daily. All the cattle have rock-salt.

Water-Supply is derived from several sources—for example: (1) From a lake; (2) From a well; (3) From a pond; (4) From a tank fed from springs and surface-water. For fourteen days during the course of the disease the water was carted daily from the lake, but without influencing the prevalence of the disease.

Management of the Breeding Cows.—Cows in milk are confined to the sheds. As they become dry they are transferred to another farm, where they remain a short time, and are then transferred to the sheds, where the calving operations are carried on.

All cows are calved down in one of six boxes, arranged in two rows of three each, placed back to back. The floors are formed of smooth Portland cement concrete; the drainage is ample and effective, and the drains are open at each end, so that there is a free current of air through them. The walls are lime-washed and disinfected periodically.

All the calves affected were from cows who had been to the part of the farm where the cows are sent to calve. To this rule there were no exceptions, but two or three that were calved elsewhere were not affected.

On May 21, Cow No. 233 calved. Calf continued free from the disease. On the 22nd, Cow No. 22 calved. Calf continued free from disease.

Both the above cows had grazed on land dressed with peat. Subsequent experiment proved conclusively that the difficulty did not arise from the peat.

Treatment of Cows preparatory to Calving.—Before calving, the cows are fed almost exclusively on bran-mash. Three days before the event they receive $\frac{1}{2}$ to $\frac{3}{4}$ lb. of Epsom salts, and after calving, 10 drops of aconite and belladonna are given alternately every two hours for the first twenty-four. No departure from this course has been made during the existence of the disease.

Management of Calves.—Immediately after birth the calves are allowed to take a portion of the first milk of the dam, after which they are removed and fed with new milk from cows kept specially for nursing purposes. In some instances calves have suffered who have not received any milk from the dam, but from the first were fed from a new source.

Proportion of Deaths to Births by Breeds.—The following statement shows the proportion of deaths to births for each breed. It will be seen that Jerseys had the highest mortality and Montgomeries the lowest.

Breed	Births	Deaths
Jerseys	19	15
Shorthorns	8	2
Dairy Shorthorn	34	10
Kerry	18	8
Red-Polled	8	5
Sussex	11	2
Montgomery	10	1
Swiss	1	—
Black Welsh	1	—
Total	110	43

Proportion of Deaths to Births for each Month.—This was as follows, the greatest mortality being in April:—

Month	Births	Deaths
January	22	4
February	12	5
March	23	11
April	24	13
May	29	10
Total	110	43

Proportion of Deaths to Births in each breed Monthly.—The following Table shows the proportion of deaths to births in each breed monthly. The Swiss calf (born in March) and the Welsh calf (born in April)—neither of which died—are not shown in the Table.

Month	Jersey		Shorthorns		Dairy		Kerries		Red-Polled		Sussex		Mont-gomeries	
	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths
January .	1	—	2	—	12	1	2	2	1	1	3	—	1	—
February	1	—	2	1	4	2	1	1	1	1	2	—	1	—
March .	2	1	2	—	5	3	4	3	4	1	3	2	2	1
April .	7	7	1	1	6	3	5	1	1	1	1	—	2	—
May .	8	7	1	—	7	1	6	1	1	1	2	—	4	—
	19	15	8	2	34	10	18	8	8	5	11	2	10	1

Date of Birth and Death of each Calf.—The following statement gives all the facts on this point:—

Date of Birth		Date of Death		Date of Birth		Date of Death	
Jan.	8	March	5	Feb. 24 ¹		Feb.	24
"	9	Jan.	16	—		—	—
"	24	Feb.	8	March 3		March	5
"	27	Jan.	29	" 3 ¹		"	3
Feb.	7	Feb.	12	" 10		"	16
"	9	"	28	" 12		"	14
"	11	"	11	" 16 ¹		"	16
"	24	—	—	" 17		"	20

¹ Premature.

Date of Birth and Death of each Calf.—continued.

Date of Birth	Date of Death	Date of Birth	Date of Death
March 17	March 20	April 28	May 3
" 20	" 27	" 28	" 9
" 20	" 23	" 30	" 5
—	—	" 30	" 8
" 31	April 4	May 1	" 9
—	—	" 1	" 5
April 5	" 9	—	—
" 7	" 10	" 7	" 9
" 9	" 14	" 8	" 14
" 10	" 11	" 9	" 14
—	—	" 9	" 14
" 20	" 21	" 9	" 15
" 25	" 30	—	—
" 25 ¹	" 25	" 19	" 25
" 25	May 8	" 24 ¹	" 24
" 28	April 30	" 25 ¹	" 25

Rate of Mortality in Calves from Cows of different Ages.—It will be seen from the subjoined that the offspring of the younger cows suffered most.

No. of Cows	Age of Cows	Calves died
7	2 years	6
16	3 "	9
34	4 "	7
6	5 "	3
7	6 "	1
6	7 "	1
7	8 and upwards	1

Subsequent Facts respecting the Farm.—Eighty-one calves were dropped upon the farm during the year 1888, after May 25—the date when the last calf was attacked; the eighty-one were all healthy at birth, remained healthy, and most of them are now upon the farm, strong and well. Cattle generally have had a great deal more silage this winter than last; at least *four* times as much has been used from October 1888 to January 1889 as from October 1887 to January 1888. Manure from peat-moss litter has been distributed to a greater extent than at any former time. The bryony and the chamomile have not yet commenced to grow; but when they do a cow or two will be tried with them. All calves dropped since January 1, 1889, are well. The four calves that were so ill in the boxes are strong and healthy now.

In the opinion of the manager everything points to the manure from the fowl-house, or, failing that, to the stinking chamomile. Whatever was the actual cause of the trouble, he thinks it was clearly traced to the hill paddock, and for this reason:—They had some strong calves that were getting milk

¹ Born dead.

from the pail; the cows that furnished that milk were sent to graze for a day or two in the above-mentioned paddock. At once the calves began to scour. The cows were removed, and the scouring ceased. The investigation might therefore be completed by trying the effect of fowl-manure upon grass given to cows, and also the young shoots (first growth) of chamomile. It must not be forgotten that the first cases occurred in January, 4 out of 22, and in February, 5 out of 12. In January chamomile had not begun to grow; towards the end of February it might. This will be seen in the present year; but the balance of evidence points to the fowl-manure.

It will be observed that the disease was confined to the period from January to May, and it is hardly necessary to remark that the events of the next three months in the farm where the disease occurred will be carefully watched, and should the affection reappear there will be a far better opportunity of tracing it to its origin than was afforded last year, when the affection had nearly ceased before the investigation was commenced.

One thing in connection with the disease may be positively asserted—i.e. the development of the morbid condition of the calves in the uterus. The animals were born diseased, and the occurrence of cases of premature birth from time to time during the period of prevalence of the disease suggests that both catastrophes were due to the same series of causes, acting with various degrees of energy under different conditions.

In July Sir John Astley applied for advice for one of his tenants, whose cattle on a certain part of his farm fell victims periodically to a fatal disease which was not attended with any very decided symptoms. Mr. J. B. Gresswell, of Louth, one of the district veterinary surgeons, was instructed to inquire into and report on the disease. Mr. Gresswell, from the symptoms and post-mortem appearances, suspected poisoning by some plant, and an inspection of the grazing-grounds to which the disease was apparently limited led him to select a species of *solanum* which was found in the hedgerows. Mr. Carruthers subsequently visited the farm, and reported that in his opinion the plants named were not likely to induce the disease. Suspicion was cast upon the water-supply; but Dr. Voelcker's analysis proved that it was unfounded.

REPORTS FROM DISTRICT VETERINARY SURGEONS.

Reports were received during the year from a few of the district veterinary surgeons appointed by the Society, in reference

to the sanitary conditions of stock in their districts. From the silence of the majority it may be concluded that their assistance had not been sought by the members of the Society.

EXPERIMENTAL INQUIRIES INTO THE NATURE OF CERTAIN DISEASES.

Among the cases of disease of cattle, sheep, and swine which were under observation during the past year, there were some which require special notice.

Actinomycosis.

This is a very common disease of the lower animals, especially cattle, and also occurs in man.

In June 1887 a member of the Society applied for advice concerning a disease which occurred every season in his herd in Norfolk. The affection was described as a form of the disease familiarly known as "wens," or in Scotland as "clyers."

From time immemorial, tumours in the throat and other parts of the body have been recognised as scrofulous or tuberculous, and their existence has been accepted as evidence of tuberculosis. From the account which the member who applied for advice gave of the disease in his herd, actinomycosis was suspected; and as Professor Crookshank of King's College was then engaged in investigating the disease in man, his attention was called to the cases. Dr. Crookshank visited the farm in Norfolk, and gained some valuable information. Some of the diseased animals were sent to the College, and the suspicion of the existence of actinomycosis was at once confirmed.

To give an idea of the nature of the disease which has long been known by the title of actinomycosis, it is necessary to explain that the organism which is always found in the diseased parts is a fungus which grows in the form of clubs or tufts radiating from a centre, as the term literally signifies. The tongue is the organ most frequently affected; but the bones, especially those of the jaw, have been often found to be diseased.

Prof. Dick, of Edinburgh, had his attention called to the disease affecting the tongue and throat of cattle in 1833, but he did not discover its true nature. By various writers it was called scirrhus tongue, cancer, osteo-sarcoma, polypus, tubercular stomatitis, and diphtheria. On the Continent, especially in Germany, the true nature of the affection was known long before it was recognised in this country. In 1882, Dr. G. Fleming published an account of the affection, quoting from some of the German authorities and referring to cases among animals in this

country, and warning consumers of meat of the danger of contracting the disease from the diseased animal. Prof. Axe also published a paper on the subject, referring to his previous observations in the *Veterinarian*. As early as 1874 Prof. Axe observed the fungus in diseased tissues, but took them to be calcareous masses.

At the time of the publication of Dr. Fleming's pamphlet wens and clyers began to be suspected as instances of actinomycosis. But until the application of last year from the member of the Society led to the inquiry in Norfolk, and subsequently in other parts of the country, the fact of these tumours being among the forms which actinomycosis most commonly assumes was not known.

A recent case of actinomycosis in a boy afforded an opportunity of testing the communicability of the disease from man to the lower animal. A calf was inoculated at the Royal Veterinary College with some of the morbid matter from the tumour in the boy's chest, and when the animal was killed two months afterwards the disease was found to be fully established. The illustrations exhibit the fungus as it was seen in the tissues of the human being (Fig. 1), and its appearance in preparations from the inoculated calf (Fig. 2).

Fig. 1.



Preparation from a tumour in a boy's chest showing the tufts of actinomycosis.

Fig. 2.



Preparation of the mesentery of a calf two months after inoculation with the discharge from the tumour of the boy. (See fig. 1.)

In Fig. 2 the club-shaped rays of the fungus are rather more prominent than in the specimen from the human subject, but there is no doubt of the identity of the two organisms.

The work which has been done during the past year in connection with this disease has led to important results. It has been clearly established that in the form of wens actinomycosis

has a very wide distribution. Cattle in all the fen districts are attacked to a greater or less degree every season. Numerous cases of the disease in different forms have also been observed in the valley of the Thames, and it may be presumed that the fungus will flourish in the vegetation of all soils where there is sufficient moisture.

Next, it has been absolutely demonstrated that the disease has no relation with tuberculosis or scrofula, of which wens and clyers have long been considered to be a distinct indication. It is hardly necessary to add that the elimination of these numerous cases from among the instances of tuberculosis will affect the percentage of cases of this disease in a notable degree.

While it has been found that actinomycosis in the common forms of wens and clyers has no connection with tubercle, it must be admitted that it is almost as grave in its character as that malady, especially when it attacks the vital organs. And in some cases it would be difficult to distinguish the one disease from the other without a careful microscopic examination of the diseased structures.

The illustration (Fig. 3, page 322) represents a calf from Norfolk affected with actinomycosis in the neck (wen). This animal afforded a good example of that state of extreme emaciation which gives rise to the term "waster" or "piner," and is generally looked upon as the last stage of tuberculosis.

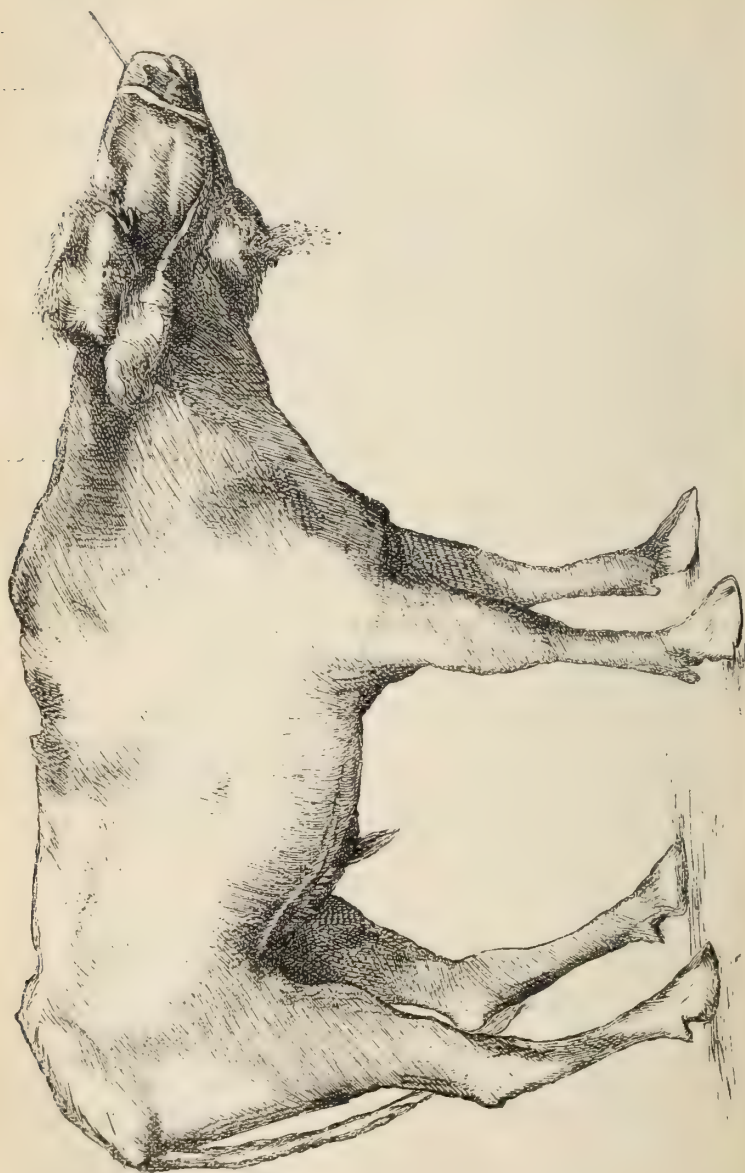
Another important point for consideration is the treatment, curative and preventive, of the disease.

Wens are treated successfully by the application of various caustics, and the same system succeeds in some cases when the disease attacks the tongue, lips, or palate. But when the deeper-seated parts are invaded there are no means of reaching them; and in some instances which have been under observation at the College, locally-applied remedies have failed to check the course of the affection.

Preventive treatment must of necessity include isolation of diseased animals, as soon as any symptoms of the affection are recognised. The fungus escapes from the diseased parts along with the discharge, and infects the feeding-grounds, and it is essential that this should be prevented by removal of the affected beasts to a place where they can be treated without danger to the rest of the herd. When a particular part of the farm is infected it is probable that a top-dressing of lime would be beneficial.

On the question of the fitness for human foods of the flesh of cattle affected with actinomycosis nothing can be positively affirmed. It is probable that the disease is more common in

Fig. 3 (see page 321).



Drawing of a calf affected with a wen in the neck.

man than is suspected, as it may easily be mistaken for other diseases, as it has been in cattle; but it is impossible to decide whether or not it is contracted by direct transmission from the animal to man by mere contact with the diseased excretion, or by the consumption of meat from affected subjects. When the affection is purely local, the fair presumption is that the flesh is not infective, and it must always be remembered that animal food is cooked before being eaten. That the subject is one of great moment from a public-health standpoint cannot be denied.

Tuberculosis.

The cases of tuberculosis in cows which were sent to the College in the past year were of a very severe form, and an opportunity was afforded of studying the effects of the consumption of milk and flesh by animals—rabbits, which are eminently susceptible to the disease.

It has been accepted as a fact by pathologists that milk of tuberculous cows is not infective unless the udder is involved in the disease. In two of the cases the udder was affected, as proved by the discovery of the tubercle bacillus in specimens of the milk.

For the purpose of illustrating the appearance of the organisms in milk the figure No. 4 is introduced.

Rabbits fed on the milk developed tuberculous ulcers in the intestines; and others, into which the milk was injected under the skin, died from general tuberculosis. Rabbits and guinea pigs fed on the flesh of the diseased cows did not take the disease. These results are signi-

ficant, but the experiments with the flesh will have to be repeated before any positive conclusion can be deduced from them. It is evident, however, that milk containing the bacilli is certainly infective.

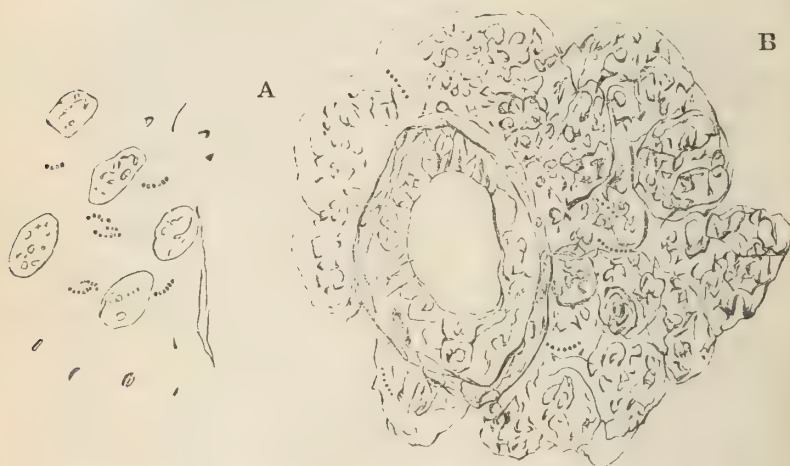
Fig. 4.



Specimen of milk showing the bacilli of tubercle among the oil globules (magnified 800 diam.).

In two other tuberculous cows the udders contained hard nodular tumours, and the milk was mixed with pus, but no tubercle bacilli were detected. Rabbits fed on the milk died from blood-poisoning, but no signs of tuberculous deposit were found after careful examination of the organs after death. So far as the inquiry has extended it appears to confirm what has hitherto been accepted—i.e. that only the products in which the tubercle organism is present are infective. The detection of the bacillus in milk becomes, therefore, a matter of great importance.

Fig. 5.



A. Preparation of sputum of consumptive patient showing the bacilli of tubercle. B. Section of lung of calf inoculated with sputum from a consumptive patient, see A. [The tubercle bacilli are seen in the structure of the lung.]

But the process of preparation which is necessary to demonstrate the organism, although very easy to an expert, is beyond the grasp of the ordinary inspector of dairies, whose opinion on such a point would only mislead.

Recent experiments at the College have proved that inoculation with the sputum of consumptive human beings induces well-marked tuberculosis in the calf. The figure (5 A B) shows a section of the lung of a calf, B, which was inoculated by the injection of sputum, A, from a consumptive patient into the abdominal cavity.

Swine Fever.

Experiments were carried on during the last year for the purpose of ascertaining whether a form of diluted virus might

be exhibited in the ordinary food of the pig in such a manner as to protect the animal from an attack of the natural disease.

Cultivations of the organism which is asserted to be the

Fig. 6 (see page 326).



Drawing of a young pig which had eaten a large portion of an anthrax spleen, showing characteristic swelling of the throat.

specific cause of swine fever were mixed with sterilised broth and given to pigs without result. All the animals died of swine fever when they were exposed to infection by being put into an infected sty. Mixtures of the active virus taken from the spleens

of swine dead of swine fever, diluted with broth, invariably killed the pigs fed on them with typical swine fever; and this result followed when the quantity of virus used was exceedingly small.

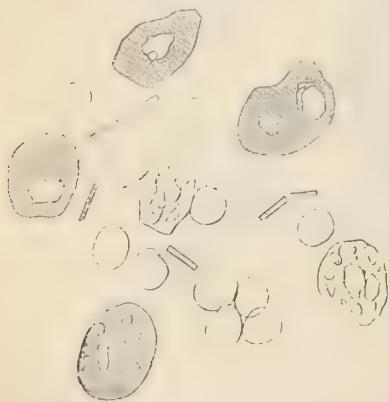
It is proposed to continue the search for a protective agent against swine fever; and in the next series of experiments certain chemical agents will be used instead of diluted or cultivated virus.

It is also proposed to make pure cultivations of all the organisms which are found in swine fever, in order to ascertain if any of them will cause the actual disease in swine with all its typical characters.

Anthrax in Swine.

It is well known that pigs which eat the offal of animals dead of anthrax die from a disease which veterinary surgeons in this country have always been in the habit of calling anthrax. On the other hand, scientists have failed in Germany, and also in this country, to induce the disease in swine by inoculation with the blood of animals which have succumbed to the disease. In these circumstances it was deemed advisable to test the susceptibility of swine by feeding them with the diseased parts.

Fig. 7.



Preparation of the blood of spleen of a sow infected with anthrax from eating offal of a bullock dead of that disease.

A spleen of an ox which had died of anthrax was given to two pigs, and the animals soon developed the usual symptoms of illness; a very marked condition being swelling of the throat, as shown in the illustration (Fig. 6, page 325).

In the cases of so-called anthrax in swine which were investigated, the bacillus which is proper to the disease was not detected, but, instead, a long curved rod, the bacillus of malignant œdema; and inoculation of guinea-pigs with the virus containing this organism caused malignant

œdema. At length a case of anthrax in an old sow was reported by Mr. Wilson, veterinary surgeon of Berkhamstead; and Dr. Crookshank, on a post-mortem examination, detected the anthrax organism in the blood of the spleen; but it was

particularly noticed that the rods, instead of being very abundant, were sparsely scattered here and there, as shown in the woodcut Fig. 7, page 326.

Further experiments proved that swine can be infected with anthrax by eating the offal of animals dead of the disease, by injection of anthrax blood, and by inoculation with pure cultivations of the anthrax bacillus.

Parasitic Diseases.

Cases of hydatids in the brain of sheep and strongles in the lungs of sheep and calves have afforded valuable opportunities of studying these diseases at the College. In regard to the brain hydatid, the life-history of the parasite has long been known. The bladder-worm in the brain which causes the giddiness and finally kills the infested sheep is the larval form of a tape-worm which infests the dog; and when the mature segments of the worm are expelled from the intestines of the dog, they fall in the pastures and are taken up by the sheep. In a short time the embryos which are contained in the eggs in each mature segment find their way into the brain and become developed into hydatids. To prevent the disease, it is obvious that dogs which harbour tape-worms should be treated with the remedies which destroy those parasites; and it is especially desirable that when the head of a "giddy" sheep is cut open by the butcher, and the hydatid taken out, it should be burnt or otherwise effectually destroyed, instead of being given to a dog, or left where one of those animals may seize and swallow it, and thus infect himself with tape-worms.

Investigations into the life-history of the lung-worms of sheep and calves, for which a special grant of 50*l.* was made by the Society, have been carried on with very promising results. It is yet too early to advance any conclusions, but it may safely be asserted that when the late Dr. Spencer Cobbold detected some embryos of the lung-worm in a small earth-worm which he found in the earth in which he had put eggs and embryos of the lung-strongle, he made a discovery which, if he had lived, he would have worked out. At the beginning of the present inquiry the line which Dr. Cobbold had indicated in his paper in the Society's Journal in 1886 (Part II.) was followed; and it was soon discovered that in the earthworms from fields in which animals affected with husk had grazed or were grazing, embryos and larvæ of strongles existed in great numbers. Some of the larvæ had evidently undergone more than one change of skin, and in several the digestive system was well developed, and the generative system sufficiently advanced to

render the distinction of sex quite easy. The illustration Fig. 8 shows a strongle larva (male) from an earthworm with the internal organs well developed.

Dr. Cobbold observed that the larvæ which he endeavoured to cultivate were killed by contact with cold water; but recent experiments have not confirmed this observation. A large number of larvæ, of various sizes from $\frac{1}{40}$ to $\frac{1}{10}$ of an inch in length, have lived through frosty nights and days since the middle of November, and more than once the water and earth in which they have been kept have been for many hours a block of ice; nevertheless, immediately that the ice was melted by exposure to the

Fig. 8.



Larva of male strongle from an earth-worm, showing the bursa with the spines at the tail end.

warmth of a room in which a fire was kept, the young worms became exceedingly lively.

The inquiry will be continued, and it may be usefully extended in several directions, especially to certain parts of the country in which, owing probably to the marshy character of the soil, the disease has a constant existence.

A report on the lung-worm disease of calves and sheep will be laid before the Veterinary Committee of the Society as soon as the inquiry has been carried far enough to justify any conclusion.

During the present session at the Royal Veterinary College special lectures on the subject of diseases of cattle, sheep, pigs, and dogs have been delivered to the advanced students by Prof. Crookshank of the Bacteriological Laboratory, King's College, Prof. Victor Horsley, of the Brown Institution, Dr. G. Fleming, C.B., Principal Veterinary Surgeon to the Forces, and Mr.

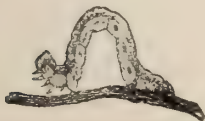
Watson Cheyne. These lectures and demonstrations are very valuable to the students, and highly appreciated by them. The attendant expenses were defrayed out of the annual grant made by the Society to the College.

By an arrangement between the College and the Veterinary Committee carcasses or parts of carcasses of animals which are suspected to have died from poison are for the future to be sent to the Royal Veterinary College for examination and chemical analysis instead of to the Society's Laboratory at Hanover Square, and the fees have been at the same time considerably reduced. It is hoped that this will result in an increase in the number of specimens sent for examination.

XVI.—*Annual Report for 1888 of the Consulting Entomologist, with additional details from previous reports, respecting some of the most injurious Insect Attacks of the past Season.*
By ELEANOR A. ORMEROD, F.R.M.S., Torrington House, St. Albans.

DURING the past season enormous and quite unusual amount of harm has been caused by insect attack to orchard fruit trees of various kinds, such as apple, cherry, nut, and plum. The notices of attack which were sent me were from most of the chief fruit-growing counties, namely, Gloucestershire, Herefordshire, Worcestershire, and Shropshire, also from Kent and Surrey; but I had none from Devon or Somersetshire.

Fig. 1.



The "Looper" caterpillar.

Fig. 2.



Cheimatomia brumata. Winter moth,
male and wingless female.

Apple blossom buds have been destroyed to a serious extent by the apple blossom weevil; great damage to orchard leaf and of various kinds was caused by one of the small green leaf weevils at Sharsted, near Sittingbourne, Kent; but the greatest harm appears to have been done by "Looper" caterpillars (Fig. 1), and mainly by those of the "winter moth" (Fig. 2), sometimes known as the Evesham moth.

The gregarious caterpillars of the two web-nest-forming kinds—namely, those of the “Lackey” and the “Small Ermine” moths—have also been very destructive; and the caterpillars of the figure-of-eight moth (Fig. 3 *a*), known as the “blue-head”

Fig. 3.



Diloba Cæruleocephala.
Figure-of-eight moth (*a*) and blue-head caterpillar (*b*).

caterpillar (Fig. 3 *b*), have also been present. Various others were present, but the above-mentioned kinds, so far as was reported to myself, were the most mischievous.

In regard to remedial measures, the treatment reported as most generally serviceable for getting rid of almost all kinds of caterpillars, and also of weevil beetles, has been *shaking them down*.

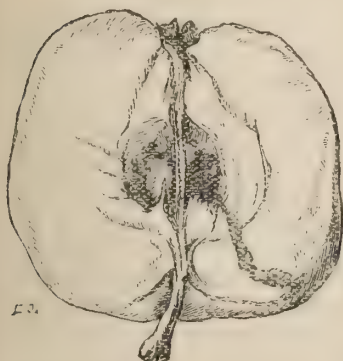
In this manner Capt. Corbett wrote me from the fruit farms of Toddington, that one man could collect two gallons of caterpillars a day, by shaking them on to a sheet; and on another fruit farm it was found that as many as five bushels per diem could be collected. The difficulty to be met is that the caterpillars (as is expressed) “head back again,” and, if not looked after, all creep up the trunks of the trees and re-establish themselves. It is, therefore, needful to lay a tarred hay rope on the ground round the tree (or do something) to keep the pests from returning. Where cloths are laid under the trees, a coating of wet tar run over them would prevent escape.

The other methods of prevention depend chiefly on the special habits of the pests, but though well known, it is impossible to compress the full description of them into space now allowable.

The Codlin moth (*Carpocapsa pomonella*), Westwood, is a very important pest. The caterpillars feed within the growing apples (Fig. 4), which consequently fall before they are ripe, and the caterpillars shortly after leave the apples, and either return to the tree to shelter themselves in the bark to turn to chrysalids, or go down into the ground for the same purpose. For this

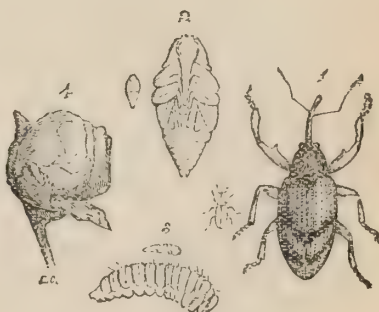
attack, therefore, as well as many others, cleaning and scraping the bark, or even well syringing it into the crannies with soft soap and a little paraffin, likewise stirring the soil or poisoning it for insect life by thorough sheep treading, are useful. The fallen apples should be collected and carried away, if possible, every morning, so as to remove them before the caterpillars have escaped.

Fig. 4.



Apple infested by caterpillar of
Codlin moth.

Fig. 5.



Anthonomus pomorum.

1, apple-blossom weevil; 2, pupa; 3, caterpillar, all life-size and magnified; 4, injured apple bud.

These remedies, and that of good shaking in early spring, apply also to the apple blossom weevils (*Anthonomus pomorum*) (Fig. 5), which pass the winter in chinks and crannies of the bark or clods near the trees. The females rarely fly, so that tarred bandages prevent many of them from going up the trees; and it may be remarked with regard to date of this and some (or probably most) of the other spring orchard attacks, that the same weather which influences appearance of the early leafage, influences appearance of the insects that feed on it, and the first may therefore be taken as a sign of the time for preventive measures against the second, rather than any given date.

So far as the above remedies can be brought to bear, they will lessen amount of the above-mentioned orchard attacks, and others which were local or less important; and a word should also be added on the benefit of preserving such birds as are certainly known to be mainly insectivorous, especially those whose habits lead them to search during winter in crannies of bark for eggs or small caterpillars. But, at the same time, a watch should be kept against their increase to overwhelming numbers so as to do more harm than good.

Insect Attacks upon Corn.

During the first half of the last season injurious insect attack of various kinds of maggots destructive to young corn was also unusually prevalent, and in some cases unusually serious.

During the early part of the summer much injury was reported as being caused to young wheat and oat plants by fly maggots feeding within the central shoot. No difference was observable in the method of injury to the two kinds of crop, but on microscopic examination of the small white maggots that caused it, those infesting the oat plants and those in the wheat plants proved to be clearly distinguishable from each other. These I traced respectively through their changes of condition up to the perfect flies, which proved in the case of the wheat to be *Hylemia coarctata* of Fallen, or "wheat bulb fly," and in the case of the oats to be the *Oscinis frit* of Linnæus, commonly known as the "frit fly."

The "Frit Fly."—This frit fly is a small, very brightly glistening, black two-winged fly, rather under the eighth of an inch in length, the legs black, with some amount of yellow or brown-yellow in the feet, the wings transparent, somewhat brown at the fore-edge. The fly, though very small, is noticeable from its peculiar habit of dancing and skipping about. The method of attack is for the female to lay her eggs on the under side of a leaf, the maggots from these gnaw their way into the heart of the young plant, and there eat away the centre until the shoot above the eaten part is consequently destroyed.

The damage that is going forward then becomes noticeable (as it did last summer in the infested districts mainly during June) from the appearance of the withered shoots. The maggot is whitish, or yellowish, cylindrical, legless; when full grown about the eighth of an inch long; somewhat pointed at the head, which is furnished with a pair of strong curved mouth hooks, and on each side near the head is an external branched spiracle. At the blunt hinder extremity the maggot has two projecting wart-like spiracles.

When full fed it leaves the inside of the plant and turns in the remains of the withered leaves outside to a chestnut-brown chrysalis, rather more pointed at the front than at the hinder extremity, which from the projection of the two wart-like processes has the appearance of being deeply cleft. The flies from the chrysalids sent me began to appear about July 9.

Up to the present year I am not aware of the attack of the *Ocinis frit* having been seriously injurious in Britain, although the fly has been known to be present, and some amount of

injury from *Oscinis vastator* of Curtis, now conjectured to be the same as the *Oscinis frit*, was recorded by John Curtis in 1844. In 1881 Mr. R. H. Meade informed me that the "frit fly" had been observed in the autumn of that year in swarms in an out-building, in the lofts of which a lot of newly thrashed barley had been stored; but it was not until 1887 that I was able to watch the insect throughout its course up to the development of the perfect fly as a regular field attack to young oat plants.

In 1888 the attack was widespread and severe, and (so far as I know from information and many specimens sent to myself) it was most prevalent in Devon and Cornwall. It was reported in Cornwall from the neighbourhood of Launceston, Bodmin, St. Columb, and Truro, from Scorrier, between Truro and Redruth, and also from Newlyn East, near Penzance. It was also reported as prevalent both in North and South Devon, and from Taunton in Somersetshire. More inland I had notices of it from the neighbourhoods of Cirencester, Reading, Tetsworth, and also Oakley near Bedford, and later on had specimens of the injury that had been caused by it to oat plants near Norwich—that is, the attack lay across the country at localities in a slanting line from Norwich to the Land's End.

The greater part of the attacks were reported as not merely to fields, but over districts and neighbourhoods, and approximate estimates of damage reckon it in various places at a third or more. On one field at the Royal Agricultural College it was roughly estimated at 90 per cent. From reports sent me in autumn it appeared that some of the infested oat crops recovered partially as to straw, and side stalks came into ear, but from the very irregular date of ripening the crop was in bad condition.

The "frit fly" attack on the Continent affects both barley and oats, the maggots of the first brood injuring the young plant in the early summer, and those of the second brood feeding later on in the soft grain in the ears of barley or oats. I, therefore, thought it possible that it might have been imported into the infested districts in foreign grain, and endeavoured to learn where the seed was procured from. I obtained information that there is large importation of Swedish oats into Bristol, from which they are sent in all directions, and also that near Bodmin a small quantity of Swedish oats was sown (in one instance at least, and probably more); but this was all I could learn about continental importation. Other correspondents have used seed home-grown or imported from Ireland.

Looking at the prevalence of this attack to such an unusual

extent over the district, I venture to suggest that it would be of a good deal of serviceable interest if farmers would examine their seed oats, or such oats as they may purchase, as to presence of fly chrysalids in them. These chrysalis cases would easily be observable as little chestnut-brown somewhat oval bodies, about the eighth of an inch long. If there were many, it might be well to "pickle" the oats so as to poison the chrysalids before the fly hatched out.

The only point brought forward which appears to bear on remedial measures is the recovery of some part of the crop after being thrown into growth by rainfall; this suggests that if, as soon as the attack was noticed, a stimulating dressing was applied, it might push on the side shoots so as to give a fair amount of crop without the great inequality of date of ripening consequent on a late second start. I have secured examples of the insect in all its stages, so that I should have no difficulty in identifying specimens which might be forwarded to me for examination in future.

Wheat-bulb Maggot.—The attack of the wheat-bulb maggot was much more injurious than that of the frit fly, and occurred mainly in the midland or eastern counties; at localities between Darlington on the north, Romford in Essex on the south-east, and Almondsbury, Gloucestershire, on the south-west part of the area.

This attack has been known in previous years, and so far back as 1882, Mr. R. H. Meade identified it as caused by the greyish, two-winged fly known scientifically as the *Hydomyza coarctata* of Fallen; and in the widespread mischief caused by it last season, in order that there might be no doubt as to the nature of the attack, I again submitted specimens to Mr. Meade, who confirmed my determination of them as being *H. coarctata*.

The damage to the young wheat plant caused by the maggots of this fly seems to me indistinguishable from that caused by the frit fly to young oats; they feed in the heart of the plant, and cause the death of the infested shoot by the direct effects partly of their gnawings, and partly of the consequent decay. The flies, however, and also the maggots of the two kinds, are easily distinguishable.

The wheat-bulb fly, *H. coarctata*, is about twice as long as the frit fly, that is, about a quarter of an inch long, and grey with black bristles, instead of being black and very smooth.

The males are faintly striped above, and have one indistinct stripe above the abdomen, which is narrow and flat. The females are of a yellower, or ashy grey; the legs black, with the shanks

pale, or yellowish in the male ; and in the female the thighs also of the legs (or of the two hinder pairs) are pale or yellowish. There is a variety with darker legs, which was also present. Looked at generally, these flies are very like the common onion flies.

The maggots also are about twice as large as the frit maggots—legless, cylindrical, and whitish—and may be distinguished by the peculiar form of the hinder extremity. This is furnished above with a pair of black spiracles, and below it projects slightly and terminates in two broad, square-ended teeth, placed centrally with a bluntly-pointed tooth, and sometimes more, placed on each side of this central pair.

The attack is one that may be observable early in the year ; but last season the great injury that was going forward was reported about May 7, when I found the maggots were already beginning to leave the plants and go into the earth, and from this time until about the 30th of the month I received samples almost daily. At this time they were turning to chrysalids, from which, however, the flies under observation did not come out until the beginning of July.

The injury caused to the young wheat was to a serious amount up to complete failure, and in some cases severe injury was reported over large areas of country, especially in the Fens and near Warrington.

So far as I learn from reports of 1888 and preceding years, this attack occurs especially on land which has been fallowed in the previous summer, and amount of presence seems much affected by local conditions.

In a field worked for turnips, and treated with lime, part, on which the crop was also dressed with farm manure, was much damaged, but on the rest (which was dressed with mud from a pond gone dry) nearly the whole of the wheat was killed ; also in another instance where the greater part of a field was treated with town manure, and the rest with mud from a dried pond, the crop on this last suffered so greatly that it could be told to a yard where the mud had been used.

This wheat maggot was noted by several correspondents as occurring specially after swedes, and it has been observed as being much worse on the part of the field where the swedes had failed. Likewise it has been found that the tops of the ridges (that is, where the soil is the hollowest from the plough having thrown up the two ridges together from opposite directions) were more affected than the ridges below these, or in the bottom.

It has also been observed as less injurious on headlands, like-

wise as leaving a belt near the hedge untouched. The dates of sowing the attacked crops, so far as I could gain information, were in October, and in a few cases later—in one instance on January 10—and as this seed did not come up until about March 10, it shows that the attack can be begun in spring.

Last season's insect attacks were exceptional, probably from the unusual weather of the preceding year; but in the case of this wheat-bulb maggot attack it seems to occur in ordinary years most on land which, by course of previous cultivation, may be presumed to be sown early, whilst the summer brood of flies is still about; also that attack is attracted by special conditions of land. There are many notes of it occurring after swedes, and also I have an observation of it coming, not yearly, but every three or four years. It may be worth while to watch it, if it follows the regular rotation.

To get this attack under we need to know where the summer brood lives; it is quite possible that eggs may be laid in decaying vegetable matter, or even in manure, and if when attack is noticed (as sometimes happens) very early in the spring, or even in February, I could have samples of soil immediately surrounding the infested plants, it might throw light on the point of whether the maggots passed part of their life in manure.

Flour attack on a very large scale from maggots which proved to be of the small newly observed moth, the *Ephestia Kuhnii*, was sent to me for consideration, and I am glad to report that we found means by mechanical applications to enormously lessen the mischief that was going forward, if not completely to clear out this attack, which is of a very serious nature in large flour-mills. I have also had much communication regarding various kinds of pests out of corn screenings, home and imported.

Foul Corn Imports.

I subjoin a digest of the information with which I have been favoured from a few large firms connected in various ways with the import trade in corn, and especially in wheat, at Hull, Liverpool, and elsewhere, relatively to the condition in which these imports come over; and, first, the very large amount of foreign matter sent therein, which is eminently calculated to convey all insect pests transmissible in straw and screenings, and likewise by its heating properties is calculated very largely to foster increase of granary weevils, which are one great cause of loss in imported corn.

The above points were the reason of my own inquiry into the matter, but accompanying this I have found there is a very

large amount of weed seed and dirt—more or less useless and deleterious in many ways—brought over, and that it is much wished by such mill firms as I have been favoured with communication from, that the cargoes should be sent over clean, so as not to require use of the expensive machinery now requisite to clear the trash.

From a milling firm, information is given that :—

The practice of sending foreign wheat mixed with rubbish has certainly increased of late years, and we find it particularly so in that coming from Australia, East India, and Russia.

It would be a great advantage to millers to have the wheat shipped clean or free from admixture of foreign substances other than wheat.

The quantity removed varies considerably according to the country from whence the particular shipment is received.

It is a well-known practice on the part of foreign shippers to add a mixture of rye with Russian wheat, and with Indian wheat seeds and dirt.

We should be very desirous to procure our wheat clean, as it would save us from loss and expense in cleaning. We have in the process to use expensive and powerful machinery.

Relatively to the adulteration above mentioned, I showed the sample of wheat in my possession, with rye in it, to a correspondent, at one time resident at Samara, in Russia, as one of an agricultural firm there, who informed me that at the time when he was resident there,

If the supply was short, it was a common practice adopted by the merchants' agents to mix rubbish with good clean samples in order to increase the bulk. We have ourselves sold to these men the siftings for the purpose of mixing.

In a work on the agriculture of Russia, by my informant above quoted, he referred me to a passage relative to the adulterated state in which wheat and other seed were exported, and gave a detailed instance where weed seeds extracted in cleaning were sold at 75 kopecks the pood—that is, about $\frac{1}{2}d.$ the lb.—the merchants having applied for them to mix with the better-dressed linseed and wheat.

The chief of a very leading firm of corn brokers says, relatively to the foul state of imported wheat and other grain :—

I think there is no doubt but that merchants and millers would very much prefer that such cargoes should arrive perfectly clean and free from dirt, straw, and seeds; and wheat that does so arrive always commands a better price in the market.

He adds a description of the primitive methods of harvesting in various countries (and foreign addition thus being mixed), with observations as to their relative amount of objectionableness, and (relatively to some observations of my own regarding the great nails which I found in corn) he explains that on

account of wire, and other foreign matters, found present, special arrangements were made to prevent damage to stones in the mills.

Further, the remark was made:—

Strong representations are made (especially to the Bombay Chamber of Commerce) with a view of checking large dirt admixtures, with only partial effect so far. A discrimination in price has some effect.

Another communication states:—

Russia ships much cleaner than formerly, but South Russia still continues to send many cargoes, of barley especially, with large percentage of admixture of dust, dirt, and seeds.

Indian shipments are now considerably better cleaned and of better quality than used to be the case some years since; while Egypt seems to prefer shipping as much soil and dirt with their grain as they think it probable importers in this country will submit to, although they frequently contract for the bulk not to contain more than 7 per cent. of dirt, and if more is found they have to pay allowance in accordance with the analysis and arbitration award.

A note is also given by this correspondent of the increase of weevil presence in dirty cargoes from the grain becoming warm, and I particularly wish to draw attention to this point, as it is a well-known and established fact that warmth is a great promoter of increase of the common granary weevil, and that the kind called the "rice weevil," also very destructive, will not increase without good warmth.

Further, this correspondent states that both India and Egypt *could* ship their grain in a good, clean state if they liked to be at the expense of using the machines they possess for the purpose; that shipments from these countries realise comparatively low prices, owing to their dirty state; and that "at all principal ports in the United Kingdom corn trade associations are established or being established for protecting the interests of importers and millers."

Another letter mentions that Russian wheat is very dirty and ill-cleaned at home, as also is the Indian wheat and the River Plate wheat. The latter is better wheat than the Russian, but comes in quite as dirty, and as full of straws in short pieces and of chaff. "We find the Indian wheat has most heavy rubbish in it." "Little flies often come out of the grains." Also this correspondent (the head of a mill firm) mentions, "Millers would rather have clean cargoes."

From replies to my own inquiries sent to the United States of America, I find there is excellent apparatus there also, but the grain is frequently sent on uncleaned.

A communication from two of the large corn mills near Hull

was accompanied by samples of so-called "rubbish" taken out of wheat from California, India, and Russia, mixed in certain proportion before being submitted to cleaning operations.

In this case there are six classes of rubbish shown:—

No. 1, broken straw used as bedding for pigs. No. 2, what is called "hen-corn," very similar to what I have been informed from elsewhere is sold as food for poultry. Nos. 3 and 4, for which a market is found, but of which the owners preferred not to name the precise use. No. 5, formed of lumps of anything which may chance, from dirt that may have in some mills to be washed away, up to any seed or insect, or fungus growth, or lumps of iron or wood; this is known sometimes as "rubble." No. 6 is very important; it is of dirty Indian wheat, which heats on the passage, and for this reason becomes rapidly infested by weevils.

The owners complained much of the dirty state that much of the wheat comes in, as it is thus more liable to breed weevils, especially the late shipments, which are sometimes nearly alive with them.

The above communications, considering them solely in the light of their bearing on transmission of insect pests, show that wheat now comes in to a great degree so mixed with rubbish suitable for bringing granary beetles and other pests in the general mass, and also such pests of the growing crops as can be carried in chrysalis state in the broken straw, as at least to make it desirable for farmers and all concerned to be warned in the strongest manner of the risks that they run by using material that either certainly is, or certainly may be, infested. Of these waste products I consider the broken straw especially to be avoided, as it is just as likely as not that it may convey Hessian fly, and the still more destructive "joint worm," the maggot of the four-winged fly known as *Isosoma hordei*.

Further, I wish to draw attention to the great loss which is occurring, and has long been occurring, in grain cargoes from granary weevil. I have been consulted about it for some time back, but the facts to which attention is now specially drawn, of the extra heating of the dirty cargoes, quite account for its great prevalence.

The amount and rapidity of the multiplication of the common granary weevil are very much increased by warmth; but that of the so-called "rice weevil," or spotted granary weevil, which is just as destructive, very much depends on warmth; and, though so destructive in heated cargoes, it is stated (and from long series of my own experiments I believe it to be the case) that as this kind will not multiply in this country on account of the tem-

perature not being sufficiently high, keeping down the heat of the cargoes would be a means of prevention.

I would therefore submit, for consideration of those concerned, whether, as it is an acknowledged fact, both practically and scientifically, that heat causes rapid increase of these pests, pending arrangements to prevent shipment of foul cargoes, the temperature of the bulk might be lowered by the plan sometimes followed with large masses of grain on shore, of having what are called "air-drains" through the mass, thus preventing the great heating.

I should also add that, as I am aware that this subject involves most important interests, I have not ventured to bring it forward in the one branch in which it falls in my own department, until after communication with leading firms, from whom (as I have noted) I have received information that the import of foul grain is a cause of so much trouble and unnecessary expense to millers, that by protective associations, and formal appeal—with more or less success as the case may be—they are endeavouring to protect themselves from continuance of the injury; and I must acknowledge the courtesy with which my requests for information have been met when the object of the inquiry was known.

Other Insect Attacks on Farm Crops.

In the course of the year inquiries have been sent regarding almost every one of our common farm crop attacks, and also regarding a few which have been little, or not at all, recorded previously as crop pests in this country. Also as to getting rid of ant-hills in pastures; and regarding bean weevils; beet-carrion beetle (new as a crop pest in England); black currant gall mite (a serious pest to growers); cabbage and turnip gall weevil; cabbage root maggots; carrot root fly (producing "rust"); cockchafers, and small chafer maggots in peat moss litter (which I reared to maturity, and found to be *Aphodius fimetarius*, and consequently harmless); chlorops on barley; clover sickness produced by eelworms; corn aphids, and corn saw-fly. Daddy Longlegs attack was little reported, and not much inquiry made about turnip flea beetles.

Other attacks reported have been Hessian fly to a small amount, and communication regarding its parasites; also hop aphids, horse warble, and bad and widespread attack of the wheat-bulb maggot of the small two-winged fly, the *Hylemia coarctata*. Likewise millepedes attack to mangolds, besides that of beet carrion beetle previously mentioned, and mustard beetles. *Otiorynchus* weevils, of which several kinds are very destructive in bush fruit

farming; red maggot of wheat and barley; scale insect on apple and pear, and so-called "slug-worm," the caterpillar of the pear and cherry saw-fly, have also been inquired about.

Serviceable information as to treatment of tulip root disease in oats caused by eelworms was sent in, as well as specimens, including in these the attack of the *Cephalobus rigidus* (Schneider), a species of eelworm not previously recorded as a British kind, and which does not form a large swelling of the bulb. I am indebted to Dr. J. G. de Man, of Middelburg, for identification of this species.

Inquiries were also sent regarding turnip grub, wireworm, willow beetles, &c., and many inquiries regarding the attack known as white-eared wheat; but, after much consultation, both British and foreign, we could not find either insect or fungoid cause, and, as far as I see, it will turn out to be a diseased-stem growth, ultimately breaking.

There was also bad attack in a few localities in spring to young wheat from a beetle grub, indistinguishable from that of the corn-ground beetle, the *Zabrus gibbus*.

All the above I attended to carefully, the successive inquiries about many of the attacks often extending over many weeks.

Besides the above-mentioned crop or farm attacks, specimens and inquiries were sent about various timber insects, and injurious and other insects, British and Colonial, which I attended to as business allowed. Many inquiries were also made as to the best methods of gaining and imparting plain information such as is serviceable to working farmers regarding farm insect attacks.

Amongst Colonial communications, I may especially mention consultation, by request of the Agent General for New Zealand, regarding the outbreak of Hessian fly in the northern island of New Zealand, and prompt measures taken by him for the prevention of its further spread; and likewise communication with Mr. Frazer S. Crawford (Inspector under the Vine, Fruit, and Vegetables Protection Act) at Adelaide, South Australia, regarding measures for prevention of the introduction of the pest into that Colony.

I should also add acknowledgment of the assistance with which I am favoured in my work both by leading Continental Entomologists and Government referees of some of our chief colonies and of the United States. The number of letters which I have written during the preceding twelve months, in reply to inquiries regarding farm insect pests, or on subjects connected with my special work, has been approximately upwards of twelve hundred (1,200), but in this I do not include

many bearing generally on the work, nor attention to a large amount of applications for warble leaflets or information on the subject, amounting by weight to between 5 and 6 lb.

I am glad to be able to report that advance is being made in the use of broad-scale remedies for some of the bad attacks. Whilst writing this I hear from Toddington fruit grounds, near Cheltenham, that about a hundred thousand trees have been banded with grease to stop attack of the wingless winter moths, and that millions of these have been caught. Five hundred were counted caught on one tree—and, as each of these moths lay about two hundred or more eggs, there is a clear saving of much threatening of attack. Cart grease is found to answer best.

Prevention of Warble Fly.

Enormous advance has been made in the matter of warble prevention. The action taken by the Royal Agricultural Society, with the co-operation of the Newcastle Hide Inspection Society, and the Nottingham Hide, &c., Market Company, at the Royal Show at Nottingham, did much good, especially by the exhibition of freshly flayed hides, showing the great maggots in the under tissues, and the injury caused by their presence.

The matter of prevention has been very well taken up by cattle owners in England and Ireland, and to some extent in Scotland. I have had communication from every one of the English counties, and I believe I may say that all the reports sent in from farmers, graziers, and those practically cognisant of the work, confirm both the success of the treatment, which has now been under wide observation for upwards of four years, and likewise the benefit to the cattle, from removal of the maggots, and preventing the summer galloping.

The reports also show that severe wasting and sometimes death from the warble attack occur much more frequently from bad warble attack than was observed to be the case until the attention of owners was directed to the subject.

Many societies and firms connected with business in cattle and hides have taken up the subject, and with excellent effect, and the continued work of the boys of the Aldersey Grammar School at Bunbury, Tarporley, Cheshire, continues to show that, by a little care in clearing the cattle of the maggots, warble attack may be almost entirely stamped out, on any one farm or over a district.

A great feeling is aroused through the country, and many of the hide firms or societies with whom I am in communication are very desirous that a stop should be put to this quite un-

necessary attack. I hope before long to be in a position to offer some statistics on this head, but meanwhile I may mention that in one of the towns of which I am favoured with official returns, the number of hides passing through the markets in the year ending May 1888 was 102,877. Of these 60,000 were estimated to be more or less warbled, and the loss to be consequently at least 15,000*l*.

We have proved that all this may be saved with very little trouble and very little expense, and the chief thing needed is to get information well spread; it is usually applied for with eagerness by owners.

The distribution of the four-leaved warble paper still continues, and I keep a supply for all applicants; and I may add that the hand-bill published in Nottingham last summer by Messrs. Vice, which I have had translated into serviceable Welsh, is being applied for at the date of writing even before it is out of press.

Depredations of the House Sparrow.

One subject more requires a note. The extent to which complaints are increasing of the way in which our truly insectivorous birds are being driven away by the inordinate and unlimited increase of numbers of the House Sparrow. Its depredations are well-known, but on the above account also I would most strongly advise all farmers to use every means in their power to keep this bird in check.

During the past year the grave injury caused by this special bird has been brought forward by the Director of the Government Experimental Farm Stations, and the Dominion Entomologist of Canada; and the Hon. C. W. Drury, head of the Agricultural Department of Ontario, announced, on October 6, that this destructive bird was no longer under the protection of the Act of Parliament respecting insectivorous birds, and that every one was at liberty to aid in reducing its numbers.

In the United States the grievous injury has been brought forward by the Ornithologists' Union with full reports, and in detail, and the ornithologist and entomologist of the Department of Agriculture have come forward strongly on the subject; and in South Australia the Royal Agricultural and Horticultural Societies are offering prizes for the largest number of heads and eggs.

XVII.—*Annual Report for 1888 of the Consulting Botanist.* By
W. CARRUTHERS, F.R.S., P.L.S., 44 Central Hill, Norwood,
S.E.

DURING the past year I have attended to 347 applications from members of the Society, referring mainly to seeds for permanent pasture.

The great reduction and simplification of the fees adopted by the Council in the course of the year has not yet affected my work. Preparations have, however, been made for undertaking the increased investigations which are expected to flow from this change.

The continued maintenance of the improved quality of the seeds is evidenced by the results of the year's work. Perhaps this will be most obvious by a tabular statement of these results:—

	Average germina- tion	Percentage containing impurities		Average germina- tion	Percentage containing impurities
Meadow fescue . .	94 . . .	0	Smooth-stalked	33 . . .	0
Tall fescue . .	85 . . .	8	meadow-grass . }		
Hard fescue . .	71 . . .	0	Wood meadow-	56 . . .	25
Sheep's fescue . .	70 . . .	33	grass . . . }		
Foxtail . . .	62 . . .	20	Sweet vernal . .	57 . . .	20
Cocksfoot . . .	89 . . .	11	Fiorin	96 . . .	100
Timothy . . .	94 . . .	0	Golden oatgrass .	31 . . .	100
Dogstail . . .	86 . . .	0	Tall oatgrass . .	72 . . .	0
Rough-stalked	82 . . .	0	Perennial ryegrass	90 . . .	55
meadow-grass }			Italian ryegrass .	97 . . .	0

The only very low germinations that came under my observation were samples of smooth-stalked meadow-grass and golden oatgrass. The latter grass is most rarely found pure; it generally contains a considerable quantity of fragments of plants and small and light seeds of other grasses, such as cocksfoot and agrostis. Of the samples of fiorin I examined, not one was free from ergot. The sheep's fescue was to a considerable extent adulterated with small seeds of hard fescue—indeed, some samples consisted altogether of such small seeds. Yorkshire fog occurred in several samples of cocksfoot, in one instance amounting to 12 per cent. of the bulk—that is to say, every eighth seed was this worthless weed. The tussock grass (*Aira cæspetosa*, Linn.) is a too frequent impurity in foxtail. Perennial ryegrass is a common medium for introducing Yorkshire fog into pastures.

The quality of the clovers was also satisfactory, with the exception of the considerable number of samples of red clover and alsike, which contained dodder. This destructive parasite can easily be separated from the clover seed, so that there is no ex-

cuse for sending out impure seed. The germination of the red clover averaged 96 per cent., the alsike 93 per cent., white clover 77 per cent., and trefoil 84 per cent.

The samples of yarrow were remarkably clean, and the germination averaged 83 per cent.

The use of mixtures continues to be a frequent method of distributing injurious seeds, and of entailing great loss on the farmer. The following Table gives the analyses of ten samples sent to different members of the Society, and further establishes the importance of the recommendation of the Council that farmers should avoid the purchase of mixtures, but should select and purchase the grass and other seeds separately and mix them for themselves :—

	2363	2508	2516	2517	2566	2567	2596	2622	2623	2628
	%	%	%	%	%	%	%	%	%	%
Ryegrass . . .	32	57	35	23	55	24	35	65	41	87
Yorkshire fog .	23	2	—	—	—	—	—	—	—	11
Bromus mollis .	—	—	—	—	—	—	—	—	36	—
Hard fescue . .	17	—	—	—	—	—	—	24	—	—
Cocksfoot . . .	13	—	—	—	10	4	6	—	—	—
Dogstail . . .	—	28	—	—	—	—	—	—	—	—
Timothy . . .	—	—	—	—	11	23	14	—	—	—
Other grasses .	4	4	—	—	—	3	3	—	23	2
Clovers . . .	—	2	58	70	24	46	42	11	—	—
Weeds . . .	11	7	7	7	—	—	—	—	—	—

In all, ryegrass forms a principal ingredient, and in several of them worthless grasses, which are more objectionable than known weeds, occur in considerable quantity.

Samples of hay, bought by a member of the Society as best Dutch hay, were examined by me, and found to be composed of the coarse natural herbage of swamps or bogs, chiefly of sedges, rushes, horsetail, buckbean, water-lily, cotton-grass, and willow. Its use had been injurious to the cows for which it was provided. The merchant refused to take back the hay and refund the money; but he was compelled to do so, a judgment having been obtained against him at the Assize Court.

Several inquiries have been made as to injuries to stock, supposed to be due to poisonous plants, and in several instances this was the case. Colchicum, Daphne Laureola, and yew had caused death to stock, but in other cases the evil was attributed by the senders to weeds that have no dangerous properties.

XVIII.—*Annual Report for 1888 of the Consulting Chemist.*
By Dr. J. AUGUSTUS VOELCKER, B.A., B.Sc.

IN the year 1888, 1,570 samples were sent by members of the Society for examination in the ordinary course, 24 by members for purposes of special investigation, 23 in connection with local agricultural societies, and 36 for the Woburn experiments—making a total of 1,653, as against 1,615 in 1887. Of these, 628 were of linseed- and cotton-cakes, over 450 being linseed-cakes. A glance at the list appended to this report will show the small extent to which rape-cake is now used as a feeding material—indeed, its relatively high price and the frequent occurrence in it of mustard-seed and earthy material give no encouragement to its use; whilst even as manure I cannot but regard it as very expensive, seeing how difficult it is to get samples without a great deal of sand and dirt. The year, especially the latter end of it, has been marked by a great increase in the price of linseed- and cotton-cakes, owing to the raising of freights. Still, this has not diminished the extent to which they have been used, stock-keepers evidently appreciating the benefits of cake-feeding as supplementary to the use of home produce. Their experience is also borne out by the experiments conducted at Woburn during the year, which are recorded in the Journal.

Linseed-cake.—A general increase in the price of cakes has led in too many cases, I fear, to the purchase of those the sole recommendation of which is that they are offered at a lower figure than others. These cakes are scattered throughout the country under the misleading name of “Oil-cake,” and are stated to be more useful at their price than pure cakes, much to the detriment of honest manufacturers of pure cake, and, I am convinced, to the disadvantage of the farmer. That they are better worth the money to the manufacturer I have no doubt, seeing he is able to use seed just as it comes in, without going to the trouble of cleaning it; and he need not be particular as to what else finds its way in—this being abundantly exemplified in the Quarterly Reports of the Chemical Committee of this Society.

As I have pointed out over and over again, as soon as admixture of any kind is permitted, there is no limit to its extent or nature, and security lies only in insisting on having *pure* cake. There is not even the excuse which margarine has, that the material is wholesome, for seeds found in the so-called “oil-cakes” are very frequently of decidedly injurious character. To call by the name *linseed* many cakes such as I have examined is nothing short of a libel on this valuable seed. At the same time there has been a remarkable increase in the number

of those who by standing out for pure cakes do succeed in getting them, and this is generally the case with members who are in the habit of sending cakes for examination, and who, I am sure, reap the benefit of doing so. The manufacturers and dealers know perfectly well who are the customers that get samples analysed and those that do not, and they frequently treat their customers accordingly. It is among those who do their business loosely and look merely for low-priced cakes that the ready receivers of inferior goods are to be found. The following extract from a French "Law to punish Fraudulent Manure-dealers," a translation of which has been issued by the Agricultural Department of the Privy Council, is interesting in this connection:—

Article 1.—Those who in selling, or causing to be sold, artificial manures, or fertilisers, shall have deceived, or endeavoured to deceive, the purchasers, either in respect of their nature, their composition, or the quantity of valuable elements they contain, or as to the use of any name, to designate or qualify them, which is customarily given to other fertilising substances, shall be punished by a term of imprisonment of from six days to one month, and a fine of from 50 to 2,000 francs, or by one only of these punishments. In the case of a second offence committed within three years after the first conviction the punishment shall be increased to two months' imprisonment, and a fine of 4,000 francs.

Article 2.—In the cases within the purview of the preceding article the tribunals may, in addition to the pains and penalties therein provided, order that the various sentences shall be published either in the form of extracts or fully, in newspapers to be selected, and posted on the doors of the houses and workshops and storehouses of the vendor, and on the door of the town hall of the place in which he resides, as well as of that where the purchaser lives.

After a second conviction within five years these publications and public postings shall always be ordered.

It is a pleasure to note that there are many good firms who have made a point of sending out nothing but pure cakes, and I am aware of hardly any case where they have failed, or experienced any difficulty, in keeping up to the standard of the requirements I laid down in my last Annual Report.

American Cakes.—These have been as usual hard-pressed, and have been found not nearly so pure as formerly. I might also say in regard to many of the foreign cakes sold by dealers, and which—being of foreign manufacture—the vendors will not guarantee, that several cases have come before me where such cakes are sold on Mark Lane, and the purchaser has been shown an analysis of them with a foot-note as to their being pure. Such printed circulars are, I would point out, quite worthless, unless accompanied by a written guarantee that the delivery shall be equal to the analysis exhibited.

Uncorticated Cotton-cake has been generally good and free

from admixture. Complaints as to woolliness and coarse husk have been less common; on the other hand, staleness and mouldiness have been more prevalent. I consider there is very great risk in using cakes that are mouldy or in bad condition. The price of common cotton-cake has gone up so much, and so nearly approaches that of decorticated cotton-cake, that I am quite at a loss to believe in its economy as compared with the latter. I am aware of the objection to decorticated cotton-cake on the score of hardness; but if obtained of fair quality, and if reasonable care is taken to break it small, I cannot but think, considering its high manurial value and feeding properties, it is of immensely superior worth. Decorticated cotton-cake has certainly improved on the whole, though it will take time to remove the prejudices which have arisen against it. Still, speaking from the experience of twelve years' use of it at Woburn, there has not been a single instance of harm done to beasts or sheep, and it always tells well—while there is nothing equal to it for manurial purposes. As I have pointed out, one should always get the best quality of this cake, even if the cost be somewhat more—which is not always the case.

Manures.—The chief feature to note is the rise in prices, consequent on the increased freight and the difficulties of procuring the raw materials. The farmer may think this hard on him; and, though he is naturally opposed to “rings” in the manure or other trades, it must be borne in mind that the prices charged before were really fictitious ones, arising out of competition of an unfair character, and resulting in the farmer being able to get manures (principally superphosphate) supplied to him at prices which did not cover the cost of manufacture. It is not well that even agriculturists should benefit at the expense of a great and important industry, to which the farmers of this country really owe very much, and the traders in which are too often, as a class, maligned, the good and bad alike.

I ought to mention here an interesting paper on “Our Supply of Phosphates for the Manufacture of Superphosphate and other Manures,” read by Mr. Hermann Voss before the Chemical Manure Manufacturers' Association in December last, and since issued as a pamphlet, obtainable from Messrs. Farquharson, Roberts & Co., 7 Upper Thames Street, E.C. In this paper useful tables of our imports of phosphatic materials are given for the last ten years, with a review of the different countries which contribute to the supply.

Owing to the Merchandise Marks Act, the question of what constitutes Pure Dissolved Bones has been taken into consideration by manufacturers, and it was resolved that by this term

should be meant a manure made from bones and acid only, without any admixture whatever; all manures containing bone mixed with other ingredients to be designated by such names as Bone Compound, Bone Manure, &c. Hereby the farmer has gained the advantage that in stipulating for Pure Dissolved Bones its composition is defined, and he can secure himself against having any manure that has a bit of bone in it palmed off on him as Dissolved Bones.

Fish Guano is a manure which appears to have very much gone out of general use in this country; comparatively few samples have been sent to me for analysis.

Basic Slag or *Cinder* continues to be tried experimentally, but not much more than this; and I am still unable, either from my own investigations or from reliable ones made by others, to speak any more favourably of it than I have done previously.

Nitrate of Soda and Sulphate of Ammonia.—The prices of these, especially that of the former, have much increased, but the cost of nitrate of soda has not interfered with its being the most generally used manure for nitrogenous top-dressing. Those who speculate on the effect of commercial transactions as likely to cause a still further rise in price must bear in mind that it does not stand alone, but that in sulphate of ammonia the farmer has a manure of home manufacture practically as efficacious as nitrate of soda, and that it is chiefly the consideration of the relative price of the unit of nitrogen in each which determines the economical employment of one or the other.

Sorghum.—The Agricultural Department of the Privy Council, through Mr. Charles Whitehead, its agricultural adviser, has undertaken an investigation into the cultivation of sorghum as a forage plant. It was believed that if sorghum could be grown successfully in this precarious climate, its use both for ensilage and for feeding purposes would, on account of the amount of sugar it contains, be especially advantageous. In response to invitations to experiment on it, 52 farmers undertook to do so. As too frequently occurs, the inclement and wet season upset all calculations, and practically destroyed all chance of the success of the experiments. In 46 cases there was total failure, and in the remaining 6 only a minimum of success; and, as a result of the enquiry, it was abundantly shown that sorghum will not answer in this country in cold and wet seasons. Nor did maize succeed last season much better; only in the south-eastern and eastern counties did there appear any hope even of future success. Only in two cases was there enough to cut for fodder, and in none enough for ensilage purposes.

Under the direction of the Council of the Society, I analysed two samples of the sorghum which had been grown. The following is a copy of my report on a sample consisting of 24 plants, grown near Maidstone :—

Water	87.50
Soluble albuminoids . . . . .	.26
Insoluble albuminoids . . . . .	.60
Digestible fibre	3.96
Indigestible woody fibre	3.05
Sugar . . . . .	.47
Other soluble carbo-hydrates, chlorophyll, &c.	2.48
Soluble mineral matter	1.29
Insoluble mineral matter . . . . .	.39
	<hr/>
	100.00
	<hr/>
Albuminoid nitrogen . . . . .	.14
Non-albuminoid nitrogen . . . . .	.21
	<hr/>
Total nitrogen. . . . .	.35

The highest of the 24 plants did not exceed 3 feet, and the analytical results, as might be expected in the case of such a season as the past, are not satisfactory.

There is less than half per cent. of sugar. It will be noted also how large a proportion of the nitrogen is in the non-albuminoid and less valuable form.

The analysis, in addition to the low height reached, shows only too clearly how very dependent this plant is upon the influence of the sun and of hot weather and climate.

In a second sample, grown near London, where the plants were two to three feet in height, I found even poorer results, as the plants contained practically no sugar at all.

Attention is called in the report of the Department to the late Dr. Voelcker's investigation on this subject made in 1859 (Journal, Vol. XX., First Series), in which he showed that, whilst there was no sugar in the plants at all during August, the warm weather in September caused them to grow well, and when examined on September 26 they contained 6 per cent. of sugar in the natural state, and 32 per cent. in the dried condition. It is clear, therefore, that, at best, the growing of sorghum must be attended with great uncertainty and risk, and in the majority of seasons it could not be expected in this climate to succeed.

Indian Wheat Soils.—In connection with a paper on Wheat-growing in India which appeared in this Journal (Vol. XXIV., Part I., April 1888), I had three samples of soil sent to me on which wheat is cultivated in India. In the absence of particulars respecting these, and of indications whether

they were considered good or otherwise, I cannot do much more than append the following analyses of them :—

Soils dried at 212° F.

	No. 1. Ghuggar bed	No. 2. Sotar	No. 3. Rousli
¹ Organic matter and loss on heating	0·63	2·67	0·65
Oxide of iron	2·58	4·32	1·62
Alumina	1·72	5·85	2·02
Carbonate of lime	2·96	2·57	3·33
Magnesia	1·07	1·97	1·07
Potash	·39	·74	·31
Soda	·15	·08	·11
Phosphoric acid	·17	·23	·19
Insoluble silicates and sand	90·33	81·57	90·70
	100·00	100·00	100·00
¹ Containing nitrogen	·07	·02	—
Equal to ammonia	·08	·02	—

No. 1 is from Bansidhar, Sirsa subdivision—a light-coloured soil, containing much fine sand, with micaceous particles. No. 2, from Beidwala, Sirsa subdivision, is heavier, and not nearly so fine and sandy; it is free from mica. No. 3 is from Gudah, and very like No. 1, though even finer and more sandy. What is characteristic in these soils is the very small quantity of vegetable matter, especially in No. 1 and No. 3, and consequently the general poverty in nitrogen, No. 3 having no appreciable quantity whatever. That anything like what would be considered in this country average crops of wheat could be grown on such soils, without at least a large quantity of manure of organic and nitrogenous character, like dung, I cannot imagine; and if it is on soils such as these that the small yields of wheat we hear of as being produced generally in India are grown, I am not surprised. On the other hand, in lime and in mineral constituents generally the soils are well supplied, No. 2 especially so.

Hay.—A member of the Society sent me for examination two samples of hay, one being Dutch hay and the other English meadow hay. Apart from the major consideration of the varieties of grasses in each sample, and the important points of condition, quality, and absence of weeds, it may be interesting to state that the analyses abundantly supported the conclusion arrived at practically as to the superiority of the English hay. The analyses were :—

	Dutch hay	English meadow hay
Water (loss at 212° F.)	13·00	13·40
¹ Nitrogenous organic matter	10·24	8·28
Digestible fibre	26·94	28·98
Indigestible woody fibre	26·67	25·31
Soluble carbohydrates, sugar, &c.	13·97	16·89
Mineral matters	9·18	7·14
	100·00	100·00
¹ Containing nitrogen	1·64	1·38

Whilst the water in each case was about the same, the English hay contained more digestible and less indigestible fibre, as also considerably more soluble carbohydrates. Nitrogen in grass, I might point out, is not, taken alone, an indication of superiority, but frequently the reverse.

Wheat-meal containing Corn-cockle.—A sample of meal sold at Chipping Norton as wheat-meal was sent me by a member, who stated that on mixing it with water and giving it to poultry several hens had died the same day. On examination of it I found there was a great deal of corn-cockle (*Agrostemma githago*, Linn.) in it, which I have no doubt was the cause of death. Injurious effects from this have been recorded before in the case of poultry, though some botanists maintain its non-poisonous character.

The following analyses may be of interest :—

Analyses of Feeding Materials.

	No. 1. Linseed- cake	No. 2. Linseed- cake	No. 3. Mixed cake	No. 4. Barley- meal
Moisture	11·75	12·02	10·55	11·05
Oil	11·37	7·37	8·40	3·47
¹ Albuminous compounds (flesh-form- ing matters)	32·19	36·25	46·76	8·51
Mucilage, sugar, and digestible fibre	32·58	32·01	25·54	48·44
Woody fibre (cellulose)	7·26	7·41	2·80	20·43
² Mineral matter (ash)	4·85	4·94	5·95	8·10
	100·00	100·00	100·00	100·00
¹ Containing nitrogen	5·15	5·80	7·48	1·36
² Including sand	—	—	1·90	5·55

The two linseed-cakes No. 1 and No. 2, though so very different in percentage of oil, were sold at exactly the same price. No. 3 was sold under the name of "Ground Nut and Linseed-cake" at 6*l.* 15*s.* per ton, but on examination it was found to contain no linseed at all. No. 4 was called "Barley-

meal," but it contained a large number of weed seeds, including rape and cockle, and had over $5\frac{1}{2}$ per cent. of sand, as well as an extremely large amount of woody fibre.

Rape-cake for Manure.—Subjoined is an analysis of rape-cake sold for manurial purposes, but which, it will be observed, was very inferior indeed, having nearly 37 per cent. of sand and earthy matters:—

Moisture	7.19
¹ Organic matter	44.81
Oxide of iron, alumina, phosphate of lime, &c.	9.44
Alkalies, &c.	1.71
Insoluble silicious matter and sand	36.85
	<hr/>
	100.00
¹ Containing nitrogen	1.63
Equal to ammonia	1.98

LIST OF ANALYSES MADE FOR MEMBERS OF THE SOCIETY FROM
DECEMBER 1, 1887, TO NOVEMBER 30, 1888.

Linseed-cakes	456	Manure-cakes	15
Uncorticated cotton-cakes	81	Refuse materials	53
Decorticated cotton-cakes	91	Sulphate of ammonia	21
Rape-cakes (for feeding)	2	Nitrate of soda	44
Compound feeding cakes and meals	38	Kainit and potash salts	29
Bean and pea meals, cereals, &c.	22	Lime	8
Rice meal	16	Soils	26
Silage and hay	5	Waters	88
Superphosphates, dissolved bones, &c.	323	Examinations for poison	7
Bone meals	114	Miscellaneous	7
Peruvian guano	34		<hr/>
Fish, meat, and other guanos	32	Investigations	24
Basic slag	13	Analyses for Woburn experiments	36
Blood	7	Analyses for experiments of local societies	23
Soot	4		<hr/>
Shoddy	31	Total	1,653
Hoofs and horns	3		

XIX.—Quarterly Reports of the Chemical Committee.

APRIL, 1888.

THE Committee call attention to the practice, illustrated by several of the following cases, of using the term "oil-cake" as a designation for cakes which, previous to the passing of the

Merchandise Marks Acts, were sold as "pure linseed-cakes." Intending purchasers of linseed-cake are advised not to accept the term "oil-cake" as a satisfactory description, but to insist on having the words "linseed-cake" inserted on the invoices, as well as obtaining a guarantee of purity.

1. Mr. Richard Henshaw, of Tithby Grange, Bingham, Notts, sent on August 15, 1887, a sample of linseed-cake, on which the following report was given:—

		"August 29, 1887.	
Moisture	.	.	11.57
Oil	.	.	10.74
¹ Albuminous compounds (flesh-forming matters)	.	.	24.06
Mucilage, sugar, and digestible fibre	.	.	38.06
Woody fibre (cellulose)	.	.	8.64
² Mineral matter (ash)	.	.	6.93
			100.00
¹ Containing nitrogen	.	.	3.85
² Including sand	.	.	2.14

"This is a very impure cake; it has an exceedingly bitter taste, and contains a large amount of rape, cockle-seed, and other foreign admixture.

"J. AUGUSTUS VOELCKER."

This sample was taken from a 2-ton lot, purchased at 6*l.* 15*s.* a ton from Messrs. H. & F. Warhurst, of Nottingham, the cake being marked "H. & F. W., Pure," and guaranteed equal to the analysis as stated on the following certificate, which was given to Mr. Henshaw at the time of purchase:—

"Chemical Laboratory, 11 High Street, Hull: May 12, 1887.

"COPY. CERTIFICATE OF ANALYSIS FROM M. D. PENNEY, F.C.S.

"Sample of linseed-cake, branded H. & F. W., Pure. Received May 10 from Messrs. H. & F. Warhurst, Merchants, Nottingham.

Moisture	.	.	.	.	.	.	13.14
Oil	.	.	.	.	.	.	11.00
¹ Albuminoids	.	.	.	.	.	.	24.37
Mucilage	.	.	.	.	.	.	36.21
Woody fibre	.	.	.	.	.	.	7.72
Ash	.	.	.	.	.	.	7.56
							100.00
¹ Nitrogen	.	.	.	.	.	.	3.65
Equal to ammonia	:	:	.	.	.	.	4.67

"This is a good linseed-cake, of excellent feeding quality, and high in oil, while fairly low in woody fibre and ash.

(Signed) "M. D. PENNEY."

“ — ”

“ November 17, 1887.

“ DEAR SIR,—We are in receipt of yours of yesterday. We have said all we can say on the subject of Dr. Voelcker. The cakes were not sold on analysis, and with his report we again repeat we have nothing whatever to do. . . .—And are, yours truly,

“ J. & J. STEPHENSON.”

Mr. Bosworth wrote that compensation was offered later, but that he considered it unsatisfactory to accept any.

3. Mr. A. C. Skinner, of Pound, Bishop's Lydeard, Taunton, sent for analysis two samples of linseed-cake, the first on October 6, 1887, the second on November 10. The analyses were as follows:—

	First sample Oct. 6	Second sample Nov. 10
Moisture	9·65	14·72
Oil	13·83	12·53
¹ Albuminous compounds (flesh-forming matters)	30·51	21·75
Mucilage, sugar, and digestible fibre	33·30	34·12
Woody fibre (cellulose)	7·17	8·90
² Mineral matter (ash)	5·54	7·98
	<hr/> 100·00	<hr/> 100·00
¹ Containing nitrogen	4·88	3·48
² Including sand	—	3·10

Dr. Voelcker reported on the first sample:—

“ A good cake.”

But with regard to the second he said:—

“ An impure cake, having considerable starchy admixture, which causes it to be very low in albuminous compounds, and having over 3 per cent. of sand.”

Mr. Skinner wrote on November 24:—

“ DEAR SIR,—With reference to the two samples of cake sent for analysis, I may say that I bought 10 tons at 6*l.* 16*s.* 3*d.* to be delivered free at my station subject to the sample first sent proving satisfactory to me. The second sample represents the delivery in bulk. I bought it of the representative of the makers, who, *I believe*, were astonished at the high standard of the analysis of the sample. The cost of carriage included in price quoted was about 2*s.* 6*d.* per ton. The makers say that the delivery was better than the sample. . . .—Yours faithfully,

“ ALFRED C. SKINNER.”

“ Dr. Voelcker.”

“ P.S.—. . . I have offered them an opportunity of sending another sample for analysis if they like to send a man to take it, and forward under joint seal. I do not yet know what they will do. The manager has gone away to the North.”

In reply to further inquiries, Mr. Skinner wrote on December 8:—

"DEAR SIR,—I first bought the cake and booked it at 6*l.* 16*s.* 3*d.* free to my station, a pure 96 per cent. seed-cake, to contain not less than 10 per cent. of oil; but when asked to sign the agreement in my pocket-book in the market, the agent for manufacturer backed out, and said he would sell the cake and guarantee it as good as the sample (the one I sent you first). I agreed to take it if the sample analysed satisfactorily.—I am, yours faithfully,

"ALFRED C. SKINNER."

"Dr. J. A. Voelcker."

The manufacturers allowed 16*s.* 3*d.* per ton on the 10 tons, but Mr. Skinner would not mention the names of the parties.

This case shows the necessity of sending to be analysed a cake from the bulk delivered, and not trusting merely to a sample; also the necessity of having a written guarantee.

4. Mr. Rowland Wood, of Clapton, Thrapston, sent on November 12, 1887, a sample of linseed-cake, the report on which was:—

"November 17, 1887.

Moisture	14.15
Oil	9.51
¹ Albuminous compounds (flesh-forming matters)	29.44
Mucilage, sugar, and digestible fibre	31.00
Woody fibre (cellulose)	9.20
² Mineral matter (ash)	6.70
	<hr/>
	100.00
¹ Containing nitrogen	4.07
² Including sand	1.95

"A cake with considerable admixture and having a bad taste.

"J. AUGUSTUS VOELCKER."

Five tons of this cake had been purchased at 6*l.* 15*s.* a ton from an agent of the manufacturers in Hull, the vendor's invoice describing it as "Linseed-Cake," and the printed heading of the invoice stating "Best Pure Linseed and Cotton Cakes." The cake was branded "—Pure." Mr. Wood said:—

"It was sold to me as pure; I particularly expressed that at the time I bought the cake, and have a witness to that effect."

On Mr. Wood complaining, he was asked to send a whole cake to the makers, they returning a certificate, of which the following is a copy:—

"Chemical Laboratory, 11 High Street, Hull:
November 30, 1887.

"CERTIFICATE OF ANALYSIS FROM M. D. PENNEY, F.C.S.

"Sample linseed-cake marked '—' received November 28 from Messrs.—

	Per cent.
Moisture	15·00
Oil	9·24
¹ Albuminous compounds	27·91
Mucilage, &c.	32·99
Woody fibre	7·06
Ash	7·80
	<hr/> 100·00
¹ Nitrogen	4·41
Equal to ammonia	5·35

"This is a sample of good linseed-cake, fully up to the average in albuminous compounds. (Signed) "M. D. PENNEY."

Mr. Wood wrote to the makers :—

"February 7, 1888.

"MESSRS.—,—I have paid Mr. — 28*l.* 15*s.* for the 5 tons linseed-cake that I bought of him of your make, and which had a very impure *analysis*. I may tell you, as I told your traveller a week last Tuesday, that I shall pay no more.

"I bought the cake to be *pure linseed*, and every cake had PURE marked on it, so it plainly shows who was in fault. . . .—Yours truly,
"ROWLAND WOOD."

The manufacturers replied :—

"—, Hull: February 9, 1888.

"DEAR SIR,—We have your letter, which has evidently been written under a misapprehension of the facts.

"We expressly sold and invoiced the cake to Mr.— as *Oil-Cake*, not as *Linseed-Cake*, and he ought to have done the *same*. If you request him to show you the correspondence you will see that is so. Mr.— knows we are not to blame in the matter.

"We, however, offered to divide the 5*l.* with him. We shall leave it to his sense of what is right.—Yours truly,
"——"

Mr. Wood subsequently informed Dr. Voelcker that he deducted 5*l.* from the account.

5. Mr. R. G. Scriven, of Castle Ashby, Northampton, sent on November 24, 1887, for analysis, a sample of linseed-cake, on which the report was :—

"November 30, 1887.

Moisture	14.82
Oil	9.33
¹ Albuminous compounds (flesh-forming matters)	25.06
Mucilage, sugar, and digestible fibre	35.11
Woody fibre (cellulose)	8.09
² Mineral matter (ash)	7.59
	<hr/>
	100 00
¹ Containing nitrogen	4.01
² Including sand	2.64

"This is a badly adulterated and dirty cake.

"J. AUGUSTUS VOELCKER."

Five tons of this cake had been ordered on October 27, and delivered on November 5, from agents of the manufacturers, one of the principal firms in Hull, at 7*l.* 5*s.* a ton delivered. The purchase was made in accordance with the following offer:—

"October 26, 1887.

"SIR,—By this post we beg to offer you prime American linseed-cake at 7*l.* per ton, and pure linseed-cake, *English made*, at 7*l.* 5*s.* per ton (which we should recommend), delivered to Castle Ashby Station; awaiting the favour of your reply. Kindly accept our apology for delay, and oblige yours truly,

"____"

The vendors again wrote on October 28:—

"R. G. Scriven, Esq.

"DEAR SIR,—We are much obliged for your order of this morning, and will forward you 4 tons on at once to Castle Ashby Station.

"We are sending you a very good cake, *ex* . . . which we are selling a quantity of, and our customers like it, and we enclose a circular received from them yesterday morning which we hope will satisfy you it is a pure cake; we use a quantity of it ourselves, and like it very much. . . .—
Yours truly,

"____"

The circular referred to was one from Messrs. . . ., notifying that their linseed-cakes, branded *pure*, should now be sold and invoiced as "oil-cake." Mr. Scriven said he could not take the cake unless he had some guarantee of its purity. The vendors explained the provisions of the Merchandise Marks Act; but on Mr. Scriven still demurring to taking the cake, they replied that, thinking their reply would have been satisfactory, they had sent the order on. An invoice was accordingly made out November 5, 1887, "5 tons pure oil-cake."

An allowance of 5*s.* per ton was made by the agent.

6. Mr. A. Peebles, agent to his Grace the Duke of Northumberland, Albury, Guildford, sent on December 1 a sample of linseed-cake, of which he had purchased 5 tons, price 5*l.* 12*s.* 6*d.* a ton in Hull, carriage to Chilworth 1*l.* 0*s.* 8*d.* per ton, the

vendor being Mr. J. Milton Jackson, 47 High Street, Hull. Mr. Peebles received from the vendor a price list which stated:—

“Good Oil-Cakes, made with Linseed . . . £ s. d. £ s. d.
Better do. (marked “BEST”)
do. do. (each cake marked “PURE” in full) 5 7 6 5 12 6”

and in consequence of this made the purchase. Dr. Voelcker's report on the cake was:—

“December 9, 1887.

Moisture	13·91
Oil	12·07
¹ Albuminous compounds (flesh-forming matters)	20·99
Mucilage, sugar, and digestible fibre	28·38
Woody fibre (cellulose)	17·91
² Mineral matter (ash)	6·74

100·00

¹ Containing nitrogen 3·36

² Including sand 2·85

“This is a bad, impure, and dirty cake, with much admixture of foreign seeds. “J. AUGUSTUS VOELCKER.”

Mr. Peebles, on complaining, received the following letter:—

“Mr. A. Peebles.

“47 High Street, Hull: January 12, 1888.

“DEAR SIR,—In reply to yours of yesterday, please refer to the invoice sent you September 30 last year, and you will see they were not sold as pure. I never expected any complaint after so long a time has elapsed. The lots you had on previous occasions were exactly the same quality, and I took it for granted you would know what you were ordering—particularly as the price (5*l.* 12*s.* 6*d.* per ton) was too low to expect a better quality—for the money it was quite as good as could be expected, and I am glad to say I have had no complaints from any one else.

“I shall be glad when you are again a buyer to send you a better article if you say I am to do so.—Yours respectfully, “J. M. JACKSON.”

7. Mr. Thos. Jeffries, of Besford House, Preston Brockhurst, Shrewsbury, sent a sample of linseed-cake on December 15 for opinion as to its purity, and, on receiving an unsatisfactory report, had a full analysis made, which was as follows:—

“December 24, 1887.

Moisture	11·05
Oil	13·07
¹ Albuminous compounds (flesh-forming matters)	21·18
Mucilage, sugar, and digestible fibre	31·98
Woody fibre (cellulose)	8·67
² Mineral matter (ash)	14·05

100·00

¹ Containing nitrogen 3·39

² Including sand 8·10

"This is a cake with a very high amount of sand, also containing starchy and other foreign ingredients. It is very low in nitrogen in consequence.

"J. AUGUSTUS VOELCKER."

One ton had been purchased from a dealer at 7*l.* 15*s.* a ton, on December 10, 1887, the makers being Messrs. Thacker & Co., Liverpool. It was invoiced to the vendor on November 8 as "pure linseed-cake." Mr. Jeffries complained to the vendor, and asked for an allowance. The following letters were received from the makers, the first being addressed to the vendor:—

"Thacker & Co., Liverpool: January 14, 1888.

"DEAR SIR,—You may deduct the 10*s.* as an extra discount from next payment, but will not remit to any one, as it might be considered an acknowledgment, from which we demur. The cake you had was not branded *pure*.

"T. & Co., J. WILSON."

"Mr. Thos. Jeffries, Besford,
Preston Brockhurst, Salop.

"Thacker & Co., Liverpool:
January 27, 1888.

"DEAR SIR,—Yours to hand; we have made a friendly suggestion to Mr. —, and if *he* cannot see his way to it, *we* can't help it. We don't know you in the matter, and can only warn any one who may do anything to prejudice our goods that they will be replied to by our solicitors.—Yours faithfully,

"B'HALL & C. LD., J. WILSON."

The vendor himself offered Mr. Jeffries 5*s.* on the ton, which was accepted.

8. Lord Brougham and Vaux sent on December 23, 1887, from Milton Farm, near Wells, Somerset, a sample of linseed-cake for analysis, and on this Dr. Voelcker reported:—

"December 30, 1887.

Moisture	13·13
Oil	9·31
¹ Albuminous compounds (flesh-forming matters)	27·06
Mucilage, sugar, and digestible fibre . . .	34·43
Woody fibre (cellulose)	8·73
² Mineral matter (ash)	7·34
	<hr/>
	100·00

¹ Containing nitrogen 4·33

² Including sand 2·45

"This is not a nice or pure cake. It has considerable admixture of rape, polygonum, and of starchy material. "J. AUGUSTUS VOELCKER."

Ten tons had been purchased from Messrs. H. Baker & Son, of Bridgwater, under the following agreement:—

"July 13, 1887.

"DEAR SIR,—We will supply best linseed oil-cake in quantities of 5 tons at a time, delivered free at Wells Station until December 31, 1887, at 6*l.* 17*s.* 6*d.* per ton. Nett cash.—Yours truly,

"H. BAKER & SON."

The first delivery (5 tons) was on August 18, and was invoiced " \diamond Pure Linseed-Cake"; but the second delivery of 5 tons on December 6, out of which the sample for the above analysis was taken, was merely invoiced "(B) Oil-Cake." On January 3, 1888, his lordship's agent received the following letter:—

"Bridgwater: January 3, 1888.

"SIR,—We shall be willing to supply you with best linseed oil-cake in quantities of not less than 3 tons at a time, delivered free at Wells Station, at 7*l.* 7*s.* 6*d.* per ton, nett cash, up to the end of June next.—Your obedient servants,

"H^r. BAKER & SON."

"This will be for the best cake, the same as you have had from us,

"H. B. & SON."

"To Mr. R. Harris, Wells."

The second delivery was part of the same contract, and was, by the vendors' admission, the same kind of cake as was received before.

This cake shows very strongly the necessity of each delivery being guaranteed and invoiced pure.

9. Messrs. Rawlence & Squarey, of Salisbury, sent on January 17, 1888, on behalf of the Earl of Pembroke, a sample from a delivery of linseed-cake, purchased from the Bridgwater and West of England United Farmers' Pure Linseed and Cotton Cake Company, Limited; one ton had been bought at 8*l.* delivered. The report on this cake was:—

"January 21, 1888.

Moisture	13·70
Oil	12·57
¹ Albuminous compounds (flesh-forming matters)	26·19
Mucilage, sugar, and digestible fibre	31·24
Woody fibre (cellulose)	9·03
² Mineral matter (ash)	7·27

100·00

¹ Containing nitrogen 4·19

² Including sand 2·19

"This cake is a badly adulterated one. "J. AUGUSTUS VOELCKER."

The cake contained a very large quantity of rape, together with a little mustard and other foreign bodies.

Mr. Rawlence stated that last year the company had been paid 638*l.* by Lord Pembroke for linseed and cotton cakes. The following letter was received from Lord Pembroke's steward:—

"Wilton: March 6, 1888.

"DEAR MR. RAWLENCE,—I did not write to the 'Farmers' Pure Cake Company,' as I was told each week that their 'representative' was coming to see me on the subject. Last week he came to me in Salisbury, and acknowledged that the cake supplied (a sample of which you had analysed for me) was not at all what it should have been. The only excuse he could offer was that their foreman had been very ill and unable to attend to the work, and that his substitute had not taken the trouble to clean the seed as imported, but crushed it, and said nothing about its being very foul. This was a most lame excuse, I thought, and, in fact, not good enough to induce me to trust them again. They offered, if I would continue to deal with them, to make me an allowance on the *one* lot from which the sample was taken; but this I declined to close with. As it would not be possible to *prove* anything against former lots, I shall simply leave them and deal elsewhere. . . .—Yours truly,

"H. M. HOLDSWORTH."

"P.S.—The manager of the Farmers' *Pure* Cake Company told me they were going to change the name. I told him I thought they had certainly better do so, for if the 'farmers' are *pure*, it is more than their cake is.

"H."

10. Mr. T. Barrett Lennard, of Horsford Manor, Norwich, sent for analysis on January 23, 1888, a sample of "sootigine." Dr. Voelcker's report was:—

"January 27, 1888.

Moisture	21.12
¹ Organic matter	16.21
Phosphate of lime . . . . .	.80
Carbonate and sulphate of lime, &c.	12.04
Oxide of iron and alumina	7.80
Alkaline salts, &c.	15.76
Insoluble silicious matter	26.27
	<hr/> 100.00
¹ Containing nitrogen . . . . .	.61
Equal to ammonia . . . . .	.74

"Over one quarter of this is sand. It has but slight value as a manure, is not worth carting any distance, and is quite three times too dear.

"J. AUGUSTUS VOELCKER."

The price of this was 40s. per ton, free on rail in London, less 10 per cent. discount for cash, and the carriage cost 10s. a ton more. Five tons were purchased, the vendors being the New Carbolic Sanitary Company, Limited, Hackney Downs Station, London, E.

11. Mr. J. M. Moubray, of Broom Court, Alcester, sent, on January 31, 1888, a sample of linseed-cake, of which the analysis was:—

"February 3, 1888.

Moisture	13·67
Oil	9·70
¹ Albuminous compounds (flesh-forming matters)	26·01
Mucilage, sugar, and digestible fibre	32·34
Woody fibre (cellulose)	9·60
² Mineral matter (ash)	8·68
	<hr/>
	100·00
¹ Containing nitrogen	4·16
² Containing sand	3·79

"This is a cake adulterated to an enormous extent; it is full of rape, and has mustard and many other foreign seeds in quantity, with starchy admixture and nearly 4 per cent. of sand.

"J. AUGUSTUS VOELCKER."

On January 23, Mr. Moubray bought 3 tons of this cake from some dealers at 7*l.* 5*s.* per ton, the following guarantee in writing being given him: "Guaranteed to be a good quality of cake, and free from any added admixture, and to contain 10 per cent. of oil." Mr. Moubray had observed that cattle did not eat it well, and on receiving the report, communicated with the vendors, who in turn wrote to the makers, Messrs. W. R. Cross & Co., of High Street, Hull. The latter wrote direct to Mr. Moubray that there must have been some mistake, and they would investigate the matter, adding that they had just seen an analysis which showed good proportions of both oil and albuminous compounds, and that it was not sold as a 95 per cent. cake. The vendors wrote on February 11:—

"To Mr. J. M. Moubray.

"DEAR SIR,—We are in receipt of your letter of yesterday's date, and we also enclose you a letter we have had from Messrs. W. R. Cross & Co. As was told you at time of purchase, no one will give a guarantee of absolute purity, as under the new Merchandise Act nothing short of 100 is such, and this it is next to impossible to get. We bought it as a pure linseed-cake in the ordinary sense of the word, and, moreover, the copy of the sale-note and guarantee on it was shown to Mr. W. R. Cross on the Thursday following at Birmingham Corn Exchange, as our Mr. . . . , seeing Mr. Cross there, mentioned to him the sale, and showing him the words of guarantee, asked him if such a one was a proper one, and to this he quite agreed, saying it was correct, and that the cake would be as represented. Under these circumstances we fail to see how Mr. Cross can quite justify his position. We feel sure you will admit that our share of the transaction is a genuine one. . . . —Yours respectfully,

"——"

On February 13 Messrs. Cross & Co. sent the following copy of analysis to the vendors:—

COPY.]

"Hull and East Riding Laboratory, Royal Chambers, Hull:

"February 9, 1888.

"This certificate refers to a sample of linseed-cake received from Messrs. W. R. Cross & Co. on February 7, 1888.

	Per cent.
Moisture	13.26
Oil	10.66
¹ Albuminoids	25.69
Digestible fibre	29.59
Woody fibre	11.06
Ash	9.74
	<hr/>
	100.00

¹ Containing nitrogen 4.06

"The above is a cake of good feeding qualities, and well adapted for getting stock into marketable condition. It contains a good proportion of both oil and albuminoids, whilst the woody fibre is low.

(Signed) "JAS. BAYNES."

At the vendors' request, Mr. Moubray sent them a sample from the cake delivered to him, wishing to forward it to Mr. Alfred Smetham for analysis; and, as the result of this, Mr. Smetham sent the following report:—

"18 Brunswick St., Liverpool: February 24, 1888.

"Messrs. ———.

"DEAR SIRS,—On examining the sample of linseed-cake which you submitted to me, I find that it consists to a considerable extent of weeds and other foreign seeds and matters, and can in no acceptance of the word be considered 'pure.'—I am, dear Sirs, your faithfully,

"ALFRED SMETHAM."

Mr. Cross declared to Mr. Moubray that there was no admixture, and that the guarantee was a correct one. Mr. Cross met Mr. Moubray, and offered to deduct 10s. a ton. Mr. Moubray was at the time in treaty with the vendors, who finally allowed him 20s. a ton.

12. Mr. T. F. Ringer, of Summerfield, King's Lynn, on February 4, 1888, sent a sample of nitrate of soda, which gave the following analysis:—

	"February 10, 1888.
Moisture	2.85
Chloride of sodium (common salt)	21.06
Other impurities	2.36
Pure nitrate of soda	73.73
	<hr/>
	100.00

"A sample adulterated with about 20 per cent. of common salt.

"J. AUGUSTUS VOELCKER."

This was sold to contain under 5 per cent. of impurities, but Mr. Ringer was unwilling to give any information.

13. Mr. J. Bourne, of Rectory Farm, Muckleston,⁵ Market Drayton, sent on February 14, 1888, a sample of manure, called

"bone and animal charcoal," offered at 2*l.* 10*s.* a ton delivered. The analysis of this was:—

		"February 22, 1888.
Moisture	.	26·07
¹ Organic matter	.	11·76
Phosphate of lime	.	traces
Oxide of iron and alumina	.	18·69
Carbonate of lime	.	7·72
Alkaline salts, &c.	.	1·77
Insoluble silicious matter	.	33·99
		100·00
¹ Containing nitrogen	.	·51
Equal to ammonia	.	·61

"This material has hardly any manurial worth, and containing, as it does, 26 per cent. of water and 34 per cent. of insoluble sandy matter, it is not worth carting any distance. "J. AUGUSTUS VOELCKER."

On receiving the analysis, Mr. Bourne did not make any purchase.

JULY, 1888.

1. Mr. A. Peebles, agent to his Grace the Duke of Northumberland, Albury, Guildford, sent on February 7, 1888, a sample of "Hamilton's Organic Manure" for analysis. Five tons of this had been purchased on Jan. 27 at 2*l.* per ton, exclusive of carriage. The manure was ordered through an agent of the makers, Messrs. Hamilton & Co., 118 High Street, Wandsworth. Dr. Voelcker's report was:—

		"February 13, 1888.
Moisture	.	35·87
¹ Organic matter	.	28·95
Phosphoric acid	.	traces
Oxide of iron and alumina	.	6·38
Carbonate of lime, &c.	.	16·23
Insoluble silicious matter	.	12·57
		100·00
¹ Containing nitrogen	.	·81
Equal to ammonia	.	·98

"A manure of but slight value, and worth nothing like the price asked. I could not advise you to use it. "J. AUGUSTUS VOELCKER."

On Mr. Peebles complaining, the manufacturers wrote saying that there was evidently a mistake, and they would send a representative to inspect the manure and arrange matters. Subsequently Mr. Peebles informed Dr. Voelcker that one of the

partners of the firm had called and made an allowance of 4*l.* 10*s.* upon the five tons purchased, explaining that an error had been committed, and that "Soot and Sewage" had been sent instead of "Organic Manure."

2. Mr. W. F. Ingram forwarded, on February 3, 1888, on behalf of Viscount Gage, Firle, Lewes, a sample of linseed-cake for analysis. The manufacturers were Messrs. T. W. Brook & Co., Tovil Oil Mills, Maidstone. Thirty tons of the cake had been purchased as a portion of a contract (in writing) dated June 27, 1887, for 50 tons of "Tovil Pure Linseed Cake," and the cakes were branded with the word "Pure."

The analysis and report were:—

"February 8, 1888.

Moisture	13·03
Oil	9·90
¹ Albuminous compounds (flesh-forming matters)	25·44
Mucilage, sugar, and digestible fibre	34·10
Woody fibre (cellulose)	7·67
² Mineral matter (ash)	9·86
	<hr/>
	100·00

¹ Containing nitrogen 4·07

² Including sand 3·46

"Not a nice, clean, or pure cake. The seed has been badly screened, and the cake has a bitter taste. "J. AUGUSTUS VOELCKER."

Rape-seed, among other foreign matters, was present in the cake.

In a letter to Mr. Ingram, the firm who sold him the cake stated that they had shown a copy of the analysis to the manufacturers, Messrs. Brook & Co., and that the latter had promised to give greater attention to the screening of the linseed in the future.

3. Mr. Fred. Pitts, of Oving, Chichester, sent for analysis on March 29, 1888, a sample of linseed-cake, of which he had purchased four tons on March 1, at 7*l.* 10*s.* per ton delivered, from an agent of the makers, Messrs. T. W. Brook & Co., Tovil Oil Mills, Maidstone. The agent guaranteed the cake as pure, and gave the following form of guarantee from the makers:—

"We guarantee our linseed-cakes to be made only from East India seed, bought on a basis of 96 per cent. purity. . . . T. W. BROOK & Co."

The analysis and report were:—

"April 9, 1888.

Moisture	12·01
Oil	11·13
¹ Albuminous compounds (flesh-forming matters)	25·19
Mucilage, sugar, and digestible fibre	33·14
Woody fibre (cellulose)	9·13
² Mineral matter (ash)	9·40

100·00

¹ Containing nitrogen 4·03² Including sand 3·85

"This cake ought to be cleaner than it is. It is not pure; was it bought as such?" "J. AUGUSTUS VOELCKER."

On Mr. Pitts giving the particulars, Dr. Voelcker wrote:—

"Frederick Pitts, Esq., Oving, Chichester.

"April 19, 1888.

"CAKE No. 658.

"DEAR SIR,—I am obliged to you for the form sent and the particulars. As you will see, the cake has just upon 4 per cent. of sand, in addition to which it has foreign seeds, chiefly rape, in larger quantity than it ought to. It certainly is nothing like what a cake would be if made from seed really 96 per cent. pure.—Yours faithfully, "J. AUGUSTUS VOELCKER."

4. Mr. Robert Tinniswood, of Rose Bank Farm, Carlisle, purchased, on Feb. 17, four tons of manure, termed "Special Land Fertiliser," at 4*l.* per ton delivered. This was supplied to him by the British Farmers' Manure Supply Association, 21 Collingwood Street, Newcastle-on-Tyne (Head offices, 20 Abchurch Lane, London, E.C.). On sending a sample to Dr. Voelcker, the following was the report:—

"February 28, 1888.

Moisture	9·13
¹ Organic matter	21·68
Phosphate of lime	7·23
Carbonate of lime	42·05
Oxide of iron, &c.	18·77
Insoluble silicious matter	1·14

100·00

¹ Containing nitrogen 3·38

Equal to ammonia 4·46

"An extravagant price to pay for such material, which, I should add, contains sulphur compounds, which make its application in a fresh state to crops very prejudicial. I would not advise you to use it.

"J. AUGUSTUS VOELCKER."

When Mr. Tinniswood sent on the report, the vendors, after some correspondence, agreed to take 1*l.* 7*s.* 6*d.* a ton. The offer was accepted.

5 and 6. These cases refer to two samples of manure called "Blood Manure," purchased from an agent of the makers, Messrs. Whinyates, Webster, McNaught & Co., Limited, Hide, Skin, and Fat Brokers, The Market, Gill Street, Liverpool. The purchasers were respectively Mr. T. Hudson, of Longslow, Market Drayton, who purchased four tons on April 11, 1888, and Mr. J. H. Kemp, of Walton, Wellington, Salop, who bought four tons on April 16, the price in each case being 3*l.* per ton delivered.

Dr. Voelcker's analyses of the two samples were:—

	" (Mr. Hudson's) (Mr. Kemp's)	
Moisture	15·08	17·01
¹ Organic matter	4·07	4·27
Phosphate of lime . . . . .	...	·35
Oxide of iron and alumina	2·90	3·33
Lime, alkalies, &c.	1·24	1·92
Insoluble silicious matter	76·71	73·12
	<hr/> 100·00	<hr/> 100·00
¹ Containing nitrogen	·21	·18
Equal to ammonia	·25	·22 "

This manure was almost worthless.

Upon complaint being made, letters were sent by the manufacturers to the respective purchasers, the terms of which were the same in both cases, as follows:—

"From Whinyates, Webster, McNaught & Co., Limited,
Hide, Skin, and Fat Brokers, The Market, Gill Street, Liverpool.

"May 3, 1888.

"DEAR SIR,—Mr. — has been with us to-day, and informs us that the manure we had sent you on his behalf you have had analysed, and the result being very unsatisfactory, and, in fact, almost worthless. We feel it incumbent upon us to clear Mr. — in this matter, as he was totally ignorant of its character, and he reasonably expected it should be a good manure and would please you. We had it prepared by one of our men to whom we entrusted it, and we are sorry to find he has not fulfilled his instructions. We have now discharged him, and are sorry Mr. — should have received such a public exposure undeservedly. To settle the question, Mr. — shall not be charged with it; consequently you will have it free of cost, trusting that the good feeling previously existing between you and him will not be broken.—Yours truly,

"WHINYATES, WEBSTER, MCNAUGHT & Co., Limited."

Both matters were concluded according to the manufacturers' offer.

7. Mr. T. R. Hulbert, of North Cerney, Cirencester, forwarded for analysis on April 27, 1888, a sample of linseed-cake, purchased at 7*l.* 12*s.* 6*d.* per ton delivered. The following was the analysis:—

	" May 4, 1888.
Moisture	13·33
Oil	12·23
¹ Albuminous compounds (flesh-forming matters)	22·25
Mucilage, sugar, and digestible fibre	36·18
Woody fibre (cellulose)	8·43
² Mineral matter (ash)	7·58
	<hr/> 100·00
¹ Containing nitrogen	3·56
² Including sand	3·27

"Very impure; it contains much foreign seed and starchy admixture; also too much sand. "J. AUGUSTUS VOELCKER."

Mr. Hulbert, though frequently pressed in the matter, refused information on the ground that, as the vendor was a friend, he was unwilling to expose him.

8. Mr. T. Morgan, of Acton Burnell, Condover, Salop, sent for analysis, on April 28, a sample of manure sold to him, on April 23, as "pure dissolved bones" free from admixture, the price being 5*l.* 15*s.* per ton, carriage free. One ton had been purchased from Mr. Samuel Smith, 4 Hargreaves Street, Redbank, Manchester.

Dr. Voelcker's report was:—

	" May 8, 1888.
Moisture	19·49
¹ Organic matter	24·77
Phosphate of lime	44·50
Carbonate of lime, &c.	11·13
Insoluble silicious matter	·11
	<hr/> 100·00
¹ Containing nitrogen	1·12
Equal to ammonia	1·36

"This is not dissolved bones at all, but inferior boiled bone. The price (6*l.* per ton) is far too much. "J. AUGUSTUS VOELCKER."

Mr. Morgan stated that 27 cwt. had been sent instead of the 1 ton ordered. Upon receiving the report, Mr. Morgan requested the vendors to remove the manure, and received the following reply:—

"MEMORANDUM.

"FROM
SAMUEL SMITH,
4 HARGREAVES STREET,
RED BANK,
MANCHESTER.

" May 14, 1888.
To
Mr. THOMAS MORGAN,
ACTON BURNELL,
SALOP.

"DEAR SIR,—If the manure is as you state, some mistake has arisen somewhere with the railway company or with my men in loading at this

end; what you ordered and what I ordered to be sent to you was dissolved bones. I cautioned the foreman to be very careful with your order, as I knew the influence you had with people in the neighbourhood. I will at once allow you any expense you have been put to in the matter, and will, if you wish, take the manure back, but would prefer, on account of the high carriage, if you could use it for something, and pay me what it is considered worth.

"I extremely regret this mistake, as I felt sure you would have become a good customer of mine in time to come.—I am, yours faithfully,

"~~W. R. SMITH,~~
"W. R. SMITH."

The manure was eventually returned.

9. Mr. W. Goodwin sent on May 4, 1888, on behalf of Captain J. H. Edwards-Heathcote, M.P., Apedale Estate, near Newcastle, Staffs., a sample of 4 tons, purchased, on April 28, as genuine raw bones, at 6*l.* per ton delivered, with 2*s.* 6*d.* per ton discount for a 4-ton lot and upwards. The vendors' quotation was for genuine raw bones, home-collected, guaranteed to contain 45 to 50 per cent. of phosphate and 4 to 5 per cent. of ammonia. The vendors were the Staffordshire Farmers' Supply Association, Limited (E. Chinn, Secretary), Seighford, Stafford.

The analysis of this sample was:—

	"May 16, 1888.
Moisture	14·19
¹ Organic matter	24·66
Phosphate of lime	52·24
Carbonate of lime, &c.	7·77
Insoluble silicious matter	1·14
	100·00
¹ Containing nitrogen	2·41
Equal to ammonia	2·92

"This is not a sample of genuine raw bones, but a mixture of raw and boiled bone.
"J. AUGUSTUS VOELCKER."

Upon making a complaint, Mr. Goodwin received the following letter:—

"THE STAFFORDSHIRE FARMERS' SUPPLY ASSOCIATION, LIMITED.

"MEMORANDUM.

<p>"FROM E. CHINN, Secretary, SEIGHFORD, STAFFORD.</p>	<p>To</p>	<p>"May 30, 1888. WILLIAM GOODWIN, Esq.</p>
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"DEAR SIR,—Thanks for your letter and copy of analysis of bones. The bones sent were bought as 'pure raw bones home collected,' and should contain 45 per cent. of tribasic phosphate of lime, and not less than 4 per

cent. of ammonia. Dr. Voelcker's analysis points to bones *not pure*, and therefore of less pecuniary value than those our Association presumably bought. You have taken a most prudent step in forwarding a sample to the analyst, and our directors will thank you most cordially for it. They will also indemnify your employer for any loss occasioned by the inferior quality of the bones supplied to you. To ascertain the difference in money value between the bones you received and those you should have received, it will be necessary to supply Dr. Voelcker with the following information:

"Description of goods—pure raw bones.

"Price—6*l.* per ton, less 2*s.* 6*d.* per ton for cash, carriage paid Carriage from 4*s.* to 5*s.* per ton.

"Quantity purchased—four tons.

"Time of purchase—April 28;

and any other particulars, and he will inform you what the pecuniary difference is. When this is done and you make a demand on our Association for such sum as may be due, then our directors will proceed to recover the same from the firm who have contracted to supply *pure raw bones*. Regretting that the analysis proves unsatisfactory, but assuring you of the Association's support,—I remain, yours truly, "EDWARD CHINN."

Dr. Voelcker, in reply to inquiry, stated that he considered under the circumstances 12*s.* 6*d.* per ton a fair deduction to be made for inferiority in quality. This allowance was agreed to.

DECEMBER 1888.

1. Mr. J. H. Kemp, of Walton, Wellington, Salop, sent for analysis on May 15, 1888, two samples of manure. Of the one called "Dissolved Bones" he had purchased, on May 2, four tons, at 5*l.* 10*s.* per ton, carriage paid; and also four tons of the other, called "Fish Manure," on the same date, at 55*s.* per ton, carriage paid. The vendors were the manufacturers, the Manchester Phosguano Company, 41 Corporation Street, Manchester. On these samples Dr. Voelcker reported as follows:—

"May 26, 1888.

DISSOLVED BONES.

Moisture	32.79
¹ Organic matter and water of combination	5.68
Monobasic phosphate of lime	11.24
Equal to tribasic phosphate of lime rendered soluble by acid	(17.60)
Insoluble phosphates	17.07
Sulphate of lime, alkaline salts, &c.	30.27
Insoluble silicious matter	2.95
	<hr/>
	100.00

¹ Containing nitrogen 27

Equal to ammonia 33

"This is not dissolved bones, and not worth the price. It is not a manure I would recommend to you. "J. AUGUSTUS VOELCKER."

" May 26, 1888.

FISH MANURE.

Moisture	18.82
¹ Organic matter	11.81
Phosphate of lime	9.94
Alkalies, sulphate of lime, &c.	57.42
Insoluble silicious matter	2.01
	<hr/>
	100.00
¹ Containing nitrogen . . . . .	.77
Equal to ammonia : . . . .	.94

" 'Fish Manure' is hardly an accurate description for this, which is a poor manure, in bad condition, and dear at the price.

" J. AUGUSTUS VOELCKER."

The "Dissolved Bones" had very much the appearance of animal charcoal, imperfectly dissolved, and, as the analysis shows, had no more ammonia than such material would contain. The analysis of the "Fish Manure" shows that it has comparatively little ammonia, and nothing like what a manure should have which fairly answers the description. On Mr. Kemp complaining, the following letter was received:—

" Mr. J. H. Kemp, Walton.

" 41 Corporation Street, Manchester :

" June 11, 1888.

" *Re* DISSOLVED BONES.

" DEAR SIR,—Yours to hand. A short time ago the firm who sold us the calcined bones came to us and brought Dr. Voelcker's analysis which he had prepared for them, showing 80 per cent. phosphate. Now, as this is exactly the same material from the same place, how can you reconcile the present analysis? We distinctly say *it is pure dissolved bones* of the identical kind above stated, notwithstanding what Dr. Voelcker may say to the contrary.

Re THE FISH.

" This is more puzzling to understand than the bone question, as we had an analysis of our ordinary manure sent by Mr. Lee of Shifnal, and which contained only a small portion of fish, to Dr. Voelcker, and he gave then 1.5 ammonia.

" We shall be glad to know if you have used the bones or fish.—Yours truly,

" *For* THE MANCHESTER PHOSGUANO Co., G. M."

Ultimately the account was settled by the payment for the eight tons of 18*l.* 10*s.*, instead of the full amount 33*l.*

2. Mr. F. S. P. Wolferstan, of Statfold, near Tamworth, sent for analysis on June 28, 1888, a sample of linseed-cake, one ton of which he had purchased at 9*l.* per ton, carriage paid, with 10*s.* per ton discount for cash in a month. The cake was delivered on May 19, and paid for on June 19. The vendor was Mr. J. K.

Bourne of Atherstone. The invoice describes it as "1 ton 95 % Linseed Cake," and the cake was branded "W. H. & W."

Dr. Voelcker's report was:—

		" July 4, 1888.
Moisture		12.12
Oil		11.20
¹ Albuminous compounds (flesh-forming matters)		26.44
Mucilage, sugar, and digestible fibre		31.51
Woody fibre (cellulose)		9.80
² Mineral matter (ash)		8.93
		<hr/> 100.00
¹ Containing nitrogen		4.23
² Including sand		3.54

"Not pure, nor 95 per cent. pure, or anything like it.

"J. AUGUSTUS VOELCKER."

Mr. Wolferstan stated that since the passing of the Merchandise Marks Act Mr. Bourne would not invoice his cakes as "Pure," but described the cake as "95 per cent." On getting a previous lot to the one in question, Mr. Wolferstan had noticed that it was invoiced "Special," and not "95 per cent.," whereupon he wrote to Mr. Bourne, and received the following answer:—

"Atherstone: June 11, 1888.

"DEAR SIR,—Until I received your letter, I was not aware that my clerk had made any change in the mode of invoicing it. The 95 per cent. is very frequently called 'special,' and is sometimes invoiced as such, but it is the same cake that you have been having, and should have been invoiced as usual 'guaranteed 95 per cent.' I am annoyed that the alteration should have been made, and have cautioned my clerk as to the future. You may rely that I send you nothing but what I can *guarantee* 95 per cent. I am sorry you have had the trouble of writing.—Yours truly,

"J. K. BOURNE."

"F. S. P. Wolferstan, Esq."

Subsequent to the receipt of the analysis on July 5, the following letters passed:—

"Atherstone: July 11, 1888.

"DEAR SIR,—On calling over my books as I do each half year (Christmas and Midsummer), I regret to find that there was a mistake in the last lot of cake sent you, and that you had the ordinary quality instead of the 95 per cent. The way in which the mistake arose was this: I asked your bailiff whether he could do with a ton of linseed-cake, as I had one at Tamworth Station—it having been ordered up with some other to make up a 4-ton load. I never gave it a thought about its being the ordinary quality, and when I got home told my clerk to book you a ton of linseed-cake. This was done, and booked to you as 95 per cent. cake, which you always now have. I now discover the mistake, and am very sorry it should have occurred. I credit your account with 1*l.* 5*s.*, which is the difference the crushers make between their ordinary quality and their 95 per cent.; or if you have any of it left, I shall be very happy to change it for you.—Yours truly,

"F. S. P. Wolferstan, Esq."

"J. K. BOURNE."

"Atherstone: July 31, 1888.

"DEAR SIR,—I enclose account owing for oats. I have credited you 25s. on the last ton of linseed-cake. I have had no reply to my letter in which I offered to exchange the cake or make the allowance. Your bailiff tells me he has instructions from you not to buy any more cake from me. I think it rather arbitrary to issue such instructions on account of a mistake, which I have acknowledged and offered to rectify. I regret to lose you as a customer, but can say and do no more than I have done.—Yours truly,

"F. S. P. WOLFERSTAN, Esq.

"J. K. BOURNE."

"Statfold: August 7, 1888.

"SIR,—Your letter of July 11, and a subsequent one (of 31st), referring to the same subject, is easily answered by a simple statement of facts *and dates*.

"I have insisted on having nothing but pure cake from you for years, and you know it. So entirely is this the case that when you invoiced to me in April last some cake as 'special,' I immediately objected, as you will doubtless recollect. When, on the passing of the Merchandise Marks Act, you refused longer to invoice your cake as 'pure,' I had some correspondence with Dr. Voelcker, and consented, and since that time have had it invoiced as 95 per cent. pure.

"Knowing all this, you deliberately offered to my bailiff some cake then at Tamworth Station which was not, and you must have known was not, 95 per cent. pure.

"You invoiced it 95 per cent. pure, and you received payment for it as 95 per cent. pure.

"I then, not liking what I read about you and your cake in the Royal Agricultural Journal of April 1888, sent a sample to be analysed by Dr. Voelcker, with the following result:—

"'Not pure, nor 95 per cent. pure, or anything like it.'

"I received this analysis on Thursday, July 5.

"Now mark the dates. On Friday, July 6, I told my bailiff the result of the analysis.

"On Saturday, July 7, my bailiff saw you at Tamworth, and told you the cake had been analysed with a very unsatisfactory result.

"And on the following Wednesday, July 11, you coolly write to me, taking no notice of the fact that you had been told the result of the analysis, but saying that you had been 'calling over your books'! that it was in fact all a mistake, and offering me a reduction of 25s., which I decline to accept.

"I prefer to send a copy of this correspondence to the Royal Agricultural Society, that those who read it may form their own conclusions.—I remain, yours truly,

"F. S. P. WOLFERSTAN."

"J. K. Bourne, Esq."

"Atherstone: August 8, 1888.

"SIR,—I pass over the insinuations in your letter of yesterday's date, as I am sufficiently well known to afford to do so. I simply reply to 'facts' with 'facts.' It is quite true that your bailiff told me on July 7 that you had had the last ton of cake analysed with an unsatisfactory result; but he will also be able to tell you that I replied to him immediately, saying, 'I have discovered that there has been a mistake over this ton, and that it was not 95 per cent., but the ordinary quality.' And I also added that I should write and inform you of the fact. Absence from home and pressure of business prevented my writing to you till Wednesday, July 11, and I then wrote describing to you how the mistake had arisen and offering to allow you the difference (25s.) that the crushers make between their ordinary quality and the 95 per cent., or change the cake if you had it by you. To this you did not reply. I have no objection to your publishing our corre-

spondence, providing you publish the *whole* and state the facts exactly as they have occurred. I have no fear of the conclusions my friends will form. Your remarks as to my name having appeared in the *Journal* of April last refer, I presume, to the cake that I sent Mr. Berry of Pheasey Farm. In that case there was nothing to reflect upon my character, and Mr. Berry continues to be a constant customer of mine.—Yours truly,

"F. S. P. WOLFERSTAN, Esq.

"J. K. BOURNE."

"Statfold: August 9, 1888.

"SIR,—I made no insinuations. I simply stated facts. I will restate them, as they are all now admitted.

"1. You knew I bought no cake but 95 per cent. pure.

"2. You offered my bailiff cake which you knew was *not* 95 per cent. pure.

"3. You invoiced it 95 per cent. pure.

"4. You received payment for it as 95 per cent. pure.

"5. You never said a word about any 'mistake' till you knew the cake had been analysed with an unsatisfactory result.

"Just a word in explanation of this. Your conversation with my bailiff began, as he tells me, by your asking for an order. He then told you that he had instructions from me not to buy anything more from you, and he gave as the reason the unsatisfactory result of the analysis. Then *for the first time* was any mention made of the 'mistake.'

"It is not unnatural to suppose that as you, when you met my bailiff, *knew*, as you state, that there had been a 'mistake,' the *first* words you would have said to him would be, 'Oh, Mr. Green, I am so sorry there has been a mistake about that last lot of cake.' But this is *not* what occurred.

"These are the facts. I make no comment on them. Every man is free to draw his own inference.—Yours,

"F. S. P. WOLFERSTAN."

"P.S.—This correspondence must now cease."

"Atherstone: August 10, 1888.

"SIR,—I have your letter of yesterday's date restating what you call 'facts.' I reply to them as under:—

"1. I did, and, with the exception of this last ton, you have always had 95 per cent.

"2. I did not. I had a 4-ton load of cake sent to Tamworth—2 tons were 95 per cent., and two tons ordinary quality. I knew I had a single ton unsold, which I offered to your bailiff, and did not know but what it was the sort he usually bought.

"3. It was invoiced 95 per cent., because it was considered to be such, and the mistake was not discovered till afterwards.

"4. Yes; but I credited you the difference in value as soon as the mistake was found out, and would have sent you cheque but you owe me money at the present time.

"5. To reply to this long clause. On Saturday, July 7, I met your bailiff, who told me that you had had the last ton of cake analysed with an unsatisfactory result, and I replied immediately that there had been a mistake, and explained to him how it had occurred. On Monday, July 30, I met your bailiff in the Tamworth Sale Ground, when I commenced the conversation by asking him for an order, and he then replied that he had instructions from you not to buy anything more from me. (Mr. Green will no doubt recollect our conversation, which took place near the ring where they sell the cattle.) In consequence of this conversation, I wrote my letter to you of July 31, which no doubt you have by you, and in which I stated your bailiff had told me what instructions he had from you. Dates in this case

are important, and you will see that yours are wrong. I wish the correspondence to cease, unless you have any more 'facts' that require reply.—
Yours truly, "J. K. BOURNE."

"F. S. P. Wolferstan, Esq."

"Statfold: August 12, 1888.

"SIR,—Your letter is quite beside the question. My bailiff distinctly asserts that the conversation on July 7 *began* by your asking for an order, and that you never said a word about the 'mistake' till he told you of the result of the analysis. Indeed you do not, and cannot, deny this. You refer to a further conversation with him on *July 30*. But that does not alter the previous facts at all, and is quite irrelevant.—I remain, yours,

"F. S. P. WOLFERSTAN.

"I send your letter and this answer to the Royal Agricultural Society."

3. Mr. Edwin Saunders, of Nornea Farm, Ely, forwarded for analysis, on October 11, 1888, a sample of linseed-cake, Two tons had been ordered on September 27, at 8*l.* 10*s.* a ton, with 5*s.* discount for cash in a month. The cakes were invoiced: "Two tons 95 % Linseed Cakes, @ 8*l.* 10*s.*," and were branded, "W. G. 95 %." They were guaranteed as being 95 per cent. pure linseed, with 13 per cent. of oil. The vendor was Mr. Alfred Balding, and the manufacturer was Mr. William Gray, Oil Cake Mills, Wisbech.

Dr. Voelcker's report was :—

"October 19, 1888.

Moisture	14·55
Oil	11·07
¹ Albuminous compounds (flesh-forming matters)	26·56
Mucilage, sugar, and digestible fibre, &c.	31·72
¹ Woody fibre (cellulose)	7·70
² Mineral matter (ash)	8·40
	100·00
¹ Containing nitrogen	4·25
² Including sand	2·25

"Impure, and made from unsound seed.

"J. AUGUSTUS VOELCKER."

This cake had a decidedly salty taste. This was confirmed by analysis; in addition to the salt there was a considerable quantity of rape. The vendor on being applied to stated that the analysis was wrong, and refused any allowance. Mr. Saunders thereupon refused to pay for the cake.

In addition to the above cases fully reported, the following cases as to *Manure* may be mentioned :—

4. Mr. O. Bennion, of Creswell, Seighford, near Stafford, sent, in April 1888, a sample purporting to be pure raw bones. Ten tons were purchased at 5*l.* 10*s.* per ton, including 6*s.* carriage. This was not pure bone, but contained only 2·84 per cent. of ammonia, instead of 4 to 4½ per cent., and was inferior to the extent of about 14*s.* 6*d.* per ton. The allowance was made, but the names were not given.

5. Mr. T. Humphreys, of White House, Middleton, Oswestry, Salop, sent, in June 1888, samples of two manures, the one called "Mangold Manure," at 8*l.* a ton, and stated to contain 12 per cent. of sulphate of ammonia, the other "Turnip Manure," at 6*l.* 10*s.* a ton. The Mangold Manure was found to contain only ·42 per cent. of ammonia, equal to sulphate of ammonia 1·65 per cent., instead of 12 per cent. as stated; and the Turnip Manure had only ·28 per cent. of ammonia; both being extravagantly high-priced manures. No further particulars could be obtained.

6. Mr. E. H. Furnival, of Bellaport Park, Market Drayton, sent, in May 1888, a sample of dissolved bones, costing 6*l.* a ton at works, which was found on analysis not to be dissolved bones, and not worth more than 4*l.* a ton.

7. Mr. Wm. Vaughan, of Caynton House, Newport, Salop, sent, in August 1888, a sample of steamed bones, out of a purchase of 14 tons, which was found to contain admixture of 7 per cent. of salt. No further particulars could be obtained.

8. Mr. W. Love, of Whitfield House, Walsingham, viâ Darlington, sent, in July 1888, a sample of nitrate of soda, which was found to contain a quantity of pyrites and 20 per cent. of common salt. No further particulars could be obtained.

9. Mr. H. Humphreys, of Woodhouse, Loughboro', sent, in November 1888, a sample of manure rape cake which was found to contain 37 per cent. of sand and earthy matters, and had only 1·9 per cent. of ammonia, instead of over 5 per cent., as it should have had.

10. Mr. Sheffield Neave, of Mill Green Park, Ingatestone, sent, in May 1888, a sample of maize-meal which was reported by Dr. Voelcker to be an adulterated sample and not genuine maize-meal. It contained a considerable admixture of oat-husk, oatmeal, and other materials. This was bought from a corn-dealer on the London market, who explained that their clerk had, owing to his ignorance in these matters, bought it from another firm, who invoiced it to them as "feeding meal." 3*l.* 18*s.* per ton was paid, instead of 5*l.* 7*s.* 6*d.*, the original price.

The following cases referring to *Linseed-cakes* will show the necessity of insisting upon a guarantee of purity being given, and that the purchaser should not be satisfied with anything short of it or recommendations of other than "guaranteed pure" cakes:—

11. Mr. W. Hollins, jun., Pleasley Vale, Mansfield, sent, in August 1888, a linseed-cake which was reported on as being "a very impure and mouldy cake." This was a cake of Messrs. Willows, Holt & Willows' manufacture, and sold by a firm in Leeds. Mr. Hollins, in a letter dated September 13, 1888, stated that this firm "do not of course call it a pure cake, but at the same time they recommend it to me in preference to a 95 per cent. pure cake, as they say it is better worth the money. They offer me the cake at 6*l.* 12*s.* 6*d.* in Leeds, less 1½ per cent. discount for cash; also a 95 per cent. pure cake at 7*l.* 15*s.* in Leeds; but they say they consider the cheaper cake better value for the money."

12. Mr. J. G. Beevor, of Barnby Moor, Retford, sent, in August 1888, two samples of linseed-cake which Dr. Voelcker informed him were very impure, and advised him to have nothing to do with them. They contained cockle, rape, hemp, spurry, niger, polygonum, and other seeds in quantity. Mr. Beevor informed Dr. Voelcker that they were offered to him, not as pure, but as being *strongly recommended*. The purchase was in consequence not made.

13. Captain Stanley, of Longstowe Hall, Cambridge, sent, in May 1888, a linseed-cake, which turned out to be impure; it was bought by the bailiff, and though it was supposed to be of the best quality, costing 7*l.* 15*s.* a ton, there was no written guarantee of purity.

14. Mr. J. A. Allen, of Cole Green House, Hertford, sent, in June 1888, a sample of linseed-cake, which was found to be largely adulterated and to contain over $6\frac{1}{2}$ per cent. of sand. It had been purchased without a guarantee from Mr. W. Gray, Oil Cake Mills, Wisbech.

15. Mr. S. Whitfield, of Firsby Farm, Conisbro', Rotherham, was offered some linseed-cake at 6*l.* 4*s.* a ton in Hull. It was sold as pure, and, being reported upon as bad and impure, it was returned.

16. Mr. J. Burr, Colworth Estate, Souldrop, Bedford, sent, in July 1888, on behalf of Mr. C. Magniac, a sample of linseed-cake, which was found to have over 6 per cent. of sand, and to be made of dirty and inferior seed. On the plea of the quantity being but small, further particulars were refused.

The two following cases refer to bad and mouldy *Cotton-cakes* :—

17. Mr. J. W. Shepperson, of White Fen, Benwick, March, sent, in August 1888, a sample of cotton-cake, which contained only 3·7 per cent. of oil, and was mouldy throughout, and not in a fit condition for feeding. In consequence no purchase was made.

18. Mr. W. D. Watney, of 33 Poultry, E.C., sent, in July 1888, a sample which had only 2·93 per cent. of oil, and which, besides being of low quality, was bad and mouldy.

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

XX.—*A French Haras and Horse Fair.*¹ By EARL CATHCART.

THE Haras, or National Stud, at Lamballe, Côtes-du-Nord, Brittany, is a fine typical stud, embracing as it does, within a stud of some 200 stallions, types of nearly all the horses of France. Lamballe is a Haras of the first rank, though not actually one of the largest, yet, situated as it is in the midst of a well-defined horse-breeding country, where the various influences, tastes, and races can be conveniently considered, it affords a most complete and interesting study.

Though a member of the Société des Agriculteurs de France, and armed with an introduction from the distinguished President, I could not obtain admission to the Haras without a special authorisation from the Minister of Agriculture. The only explanation of this strange difficulty that I could get was, there had been a row somewhere—the newspaper press took it up—it was about some admission to a Haras, the Directeur there was a General—“*et on est tombé sur le Général—toujours la politique!*” and hence, as regards foreigners, the general order of exclusion. My visit in the summer of 1887 was rendered doubly pleasant and agreeable by the instructive society in which it was made; I was accompanied by my friends General Julian Hall and the Comte de Carcaradec, a Breton of the Bretons. Both my friends are devoted to the noble animal the horse, and the

¹ My information is derived from observation and conversation and some general reading, but I have had especially before me two books: *Le Cheval*, par Eug. Lemichel, vétérinaire en premier (Brunox, Paris), 3rd edit., a sort of textbook for the army and the military school of Saint-Cyr; and *Les Chevaux de Trait Français*, par Eug. Gayot, formerly Inspector-General-Director of Haras (Librairie de la Maison Rustique, Paris, 1887). M. Gayot has also published, according to the *Dictionnaire Universel*, a statistical atlas of the horse produce of France, and M. Richard (du Cantal) has written *Annales des Haras*.

Count is not only "*un véritable ami du cheval*," but also an accomplished coachman, and he is said, and I believe justly said, to be the most popular man in all Brittany.

Brittany, the north-western peninsula of France, is not mountainous, but remarkable on account of rugged physical features and tracts of moor, over which are liberally scattered melancholy monuments of forgotten times: there are beautiful valleys, traversed by full and flowing rivers, smiling upland pastureland, and rich lowland meadows, together with, near the sea, a tract of wonderfully rich vegetable-growing soil. Agriculture is backward, the enclosures are small, the hedges and banks well timbered, and the country generally well wooded. The earth-hungry Celtic people are philoprogenitive, conservative, and superstitious, speaking the Celtic language, and affecting in their peculiar costumes loudish colouring, such as red, violet, and blue. The law—*le morcellement*—together with the race-instincts of the people, has reduced, and is reducing, many properties to almost intangible proportions.¹ The climate resembles our own, and the generally firm and igneous geological formation of this little Scotland, without its mountains, together with other surroundings, render much of the country well adapted for the purposes of horse-breeding.

That ever famous farmer-penman Arthur Young made the tour of Brittany in 1787, exactly 100 years before my visit. Arther Young's quarto volumes are therefore admirable historical landmarks—true photographs of the old order—by which to estimate a century's progress. In France, he says, you pass from beggary to profusion—there are no degrees—there is nothing in Brittany but privilege and poverty. The farms are minute; the skill in agriculture is no better than that of the Huron Indians; in the towns there are heaps of dirt, no glass in the windows, no light; the inns are poor holes. As for the people, the men—the Celtic bas-Bretons—are like the Welsh, with a half-energetic, a half-lazy expression; early in life the poor womenkind lose all the softness of their fair sex. Arthur Young sketches a bas-Breton noble, with his large sword and his little miserable but nimble nag. Lamballe, he says, in winter is a town of the *noblesse*, a little Paris. The best horses in France, according to Arthur Young, are the Normans for draught, the Limousin for the saddle; there is a great importation of horses from England, but that does not matter, as French land can be put to better account than horse-breeding. Arthur

¹ I would call attention to a clever sketch of French agricultural history in an article in the *Edinburgh Review* for October 1887, "*Rural France*," by R. E. Prothero.

Young rode a blind English mare and carried saddle-bags; his mare was worth sixteen guineas English money; she excited general admiration, and never in Brittany met a rival. He says in his day the finest horse in Bretagne was not worth two and a half guineas.

To understand, or to try to understand, the mental aim which has suggested the collection of the stud at Lamballe, now having a life and an experience of some forty years, we must remember the physical geography of Brittany, as well as study what I may be allowed to call a hippic map of the country. The Count de Carcaradec, who has an intimate knowledge of the subject, was so good as to mark a map for me dividing the whole province into six districts thus hippically characterised.

In No. 1 district, with Dol for a centre, there are no mares; they buy at six months, and sell at four years old for Paris and the South, heavy horses. In No. 2, round Lamballe and Lannion, every farm has four or five mares, heavy horses, and all brood mares. The fillies are often kept, or bought for breeding in Finistère; the entire colts are sold to No. 1 district. In No. 3, Morlaix and the surrounding country, five or six brood-mares are kept on each farm, and sent to Norfolk horses, or to Normandy carriage-horses. Carriage-horses and posters are raised, and sold at three years old to go everywhere. No. 4 district, circling Carhaix, Quimper, and that neighbourhood.—Two or three brood-mares may be found on each farm; these little mares of the country have blood, and are put to blood-horses or to well-bred half-breds. In No. 5, Vannes, Redon, and the parts adjacent, you may find a mare or two on each farm: but the horses hereabouts do not show much quality; this is the home of the Bidets, the little native hardy Bretons. In No. 6 district, down about Nantes, near La Vendée, many good horses are bred, both hunters and harness-horses—half-bred horses. The Government inspectors are always looking round these districts, and buy a horse or two in each town just “to keep the thing going.”

Haras is said¹ to be derived from the Arab word “Faras,” a horse; and synonymous words are to be found in various languages, as the Spanish “Alfaraz,” and also in bas-Grec and bas-Latin. These national studs are as old as the Medes and Persians. The French national Haras dates from Cardinal Richelieu’s time, and was especially designed with a view to army remounts. There was an edict in the year 1639—and in 1665 the Minister Colbert re-established the Haras system on

¹ *Grand Dictionnaire Larousse.* Paris, 1873. Art. “Haras.”

a wider basis, resting more on public co-operation. These establishments were suppressed by the Republican Government in 1790, and re-established under the First Empire in 1806. In 1831 a real impulse was given to French national horse-breeding, and the English thoroughbred horse was introduced. Soon afterwards the French Stud-book was by law established; before this time the Arab was the type of the French light horses—*l'arabe partout et toujours*.

The Haras is the creature of the law; there are now about twenty-one of these Government establishments in France, distributed, but prevailing towards the horse-breeding countries of the West. They are generally studs of entire horses only; one, however, Pompadour, is an Arab breeding establishment, with mares as well as horses; and there are one or more such hermaphrodite establishments—that is to say, establishments which multiply within themselves. The French official report for 1887 clearly states the double mission of the Haras—to supply horses for agriculture and trade, and proper and sufficient horses for the army. In the spring there are 650 stations where stallions are placed; the fees for service are small, averaging 5s. 9d. of English money. Prizes to encourage breeding are also given at horse and agricultural shows, and at race-meetings, and in other ways; still, the official cry is for more money.

On January 1, 1887, there were 2,514 State stallions on the effective list, classified as under:—

Taoroughbred English	.	.	.	.	.	.	.	193
Pure Arabian	.	.	.	.	.	.	.	125
Anglo-Arabians	.	.	.	.	.	.	.	124
Half-breeds	.	.	.	.	.	.	.	1,765
Draught	.	.	.	.	.	.	.	302
								<hr/>
								2,514

Among the half-bred stallions, 106 were of the Norfolk type, born either in England or France. It is important to observe, as marking a reaction, that it is stated not one of the 246 stallions bought in 1887 was purchased in England; home-bred French horses, thought good enough, had been produced in sufficient numbers. The foreign sales have increased; exportation from France has largely increased; they imported into that country, in 1887, 10,212, and exported 34,518 horses. 48 mares per stallion is the average duty obtained; this is a low average according to our experience, but then it is to be remembered these French horses do not travel, they stand at home. 781 English thoroughbred mares are mentioned out of a total of 118,344 mares, 384 Anglo-Arabian mares; and 46,292, about one half, were draught

mares. Besides the State stallions, 1,274 private stallions were approved, and 176 more were authorised; no other than certificated stallions may be used, except on the owners' own mares; the regulation of stallions, it is said, is in vigour everywhere, England only excepted. In regard to soundness, curiously enough, the law as to stallions is very defective, and applies only to wind-affections.

Money, notwithstanding the official cry for more, appears to have been spent very freely; a very large sum of Government and private money was spent on the encouragement of horse-racing—flat, hurdle, and trotting races. I saw some of this racing, of each kind, and on a large scale, at Dinard, and in part the performance was dangerous, I fear fatally so; “pumped” horses, without rising, tumbled over the banks; the whole affair did not appear to me to be worth a considerable expenditure. I gather from the newspapers that the Société Hippique offered in prizes for the year 1888 no less a sum than 12,000*l.* Monsieur de Pont Brisson, the Deputy, told me at dinner at the Rural Club, Morlaix, that the whole National Haras budget for 1887 amounted to 5,000,000*f.* The exact dotation for 1889 is officially stated to be 7,367,180*f.*, or 294,687*l.* 4*s.*; but it is not easy to say what exactly is included in this sum and not charged under other heads—figures are proverbially deceptive.

M. Lemichel, Principal Veterinary Surgeon of the French army, in his important little work, “*Le Cheval*,” recognises at least ten of the principal families, or races, of the French horse:—The *Boulonnais* horse, a dray-horse. The *Percheron*, the beautiful energetic trotting omnibus- or cart-horse. The *Normandy* race, the heavy cavalry officer's charger, and the carriage-horse in perfection. M. Lemichel says the Haras are spoiling these horses by infusion of blood—*mélange de sang Anglais*! The *Breton* race is one of the most precious in France; they, says M. Lemichel, are received by the regiments with disgust, but soon improve beyond recognition. The *Ardennais*: he says of them their hocks are too bent, they are also cow-hocked; but I saw beauties in Belgium,¹ and they were sold for money. The race *Comtoise*, bordering on Switzerland, are inferior waggons, susceptible of the amendment they much need. The *Poitou* race, on the West Central Coast, a big ugly beast, but improving; he lives in the marshes; with a big belly, a short quarter, and goose

¹ Notwithstanding, I was shown 600 horses of the 1st Belgian Guides—a crack regiment [1884]; all Irish horses. All their cavalry are mounted on Irish horses at an average cost of 50*l.* The Belgian cavalry on a war footing would require over 7,000 horses. The artillery and train are horsed from the Belgian Ardennes.

rump! The *Limousin* race, a sort of Barb, of Oriental origin; this is a pretty horse: M. Lemichel says the unreflecting taste for English horses alone accounts for the discredit into which this race has fallen; the Haras with its English stallions is founding an inferior mixed race. The *Auvergne* race, an inferior sort of Limousin horse. The race of *Navarre*, on the Spanish frontier, an Andalusian crossed with the Arab, and next to the Limousin the lightest and most beautiful horse of France. "We begin to experience," says M. Lemichel, "the disastrous influences of English blood." There is throughout evidence of the reaction from the days and fashions of the last Empire and the influence of the French Jockey Club and General Fleury. M. Lemichel is undisguisedly of opinion that in effect the leaven of English blood is generally working disastrously as regards the horses in France.

Before reaching Lamballe, and by way of further preface, it is well to explain that all hippic France is divided into two hostile parties, Anglophobists, or "No bloods," and Anglo-maniacs, those who advocate a variously graduated infusion of that pure and precious fluid. Hence, from party and adverse feeling, a serious difficulty no doubt arises in the way of the administration of the Haras. I take M. Lemichel, *vétérinaire en premier*, as representing the "No blood" party, reserving the thoughtful and most practical opinions of the very experienced M. Gayot, formerly Director-General of Haras, for the conclusion of this paper. M. Gayot may be considered a moderate representative of the French school which favours the judicious use on French mares of the English thoroughbred horse. M. Lemichel in his book dwells on the races of horses as racy of the soil, or, in other words, the race and name follow the habitat. He goes on to say that all French races are deteriorated chiefly by the influence of English stallions. We must remember, however, M. Lemichel notwithstanding, that all the French races are not only intermixed one with the other, but that since the days of the Romans there have been endless wars and invasions—the French alternately invaded and invading—camps, armies of occupation, intermixtures of all sorts of horses without any regard to selection—Arabs Barbs, Moorish, Spanish, Flemish, English, Germans, Danes, Russians, Cossacks, and others.

As regards the Haras system M. Lemichel utters an exceedingly bitter cry: "*Nous avons remplacé le cheval à campagne par le cheval de revue.*" Pure blood has poisoned our lighter horses, and made them fit only for the games of the hippodrome; the administration of the Haras should at least understand that the aristocratic view of equine fabrication ruins the peasant as well as the proprietor, and estranges all reasonable people from this

speculation, thus rapidly annihilating our hippic force. These hot-house stallions of the Haras are no good; we want the products of an open country and open air. The *vétérinaire en premier* next takes a turn at the "Anglomaniacs of our regiments," the sportsmen—"le sportsman, qui tient le stick au lieu du sabre." The English crosses, he says, are delicate; it is impossible to keep them going in our regimental stables. The hunter only is to be called English, in the sense of a good horse; we admire, but reject him; he cannot bear privation; of this in the Crimea our allies had painful proof. The inquiry here might naturally occur, What on earth would you do, M. Lemichel, to raise a vast mixed quantity of rough and flabby scratch light horses to something like an even and useful level? He virtually replies, Improve our French native races by inter-selection and better keep—truly better keep is a great factor—but what of the system "*de l'in and in*," that is to say, "*des unions dans et dans*." M. Lemichel finally winds up with a passage of splendid eloquence referring to the warrior virtues of the true French war-horse, which, forgetting a middle piece, are, according to him, legs and heart!—"des jambes et du cœur."

Lamballe, it should be distinctly understood, is a stud of entire horses only: collected at that place, and there maintained during the inert part of the year, during the season they are distributed all over the district at such stations as appear best to the Director. The word station implies that the horses do not travel, but approved mares are brought to them, the fee for service in Brittany being from 6 to 20 francs, and the duty done per horse does not exceed the low average previously mentioned.

Reader, please figure to yourself a great parallelogram about 300 yards long, by 44 yards wide, the ground absolutely flat, and without a loose stone. One end of the Lamballe Haras is occupied by the great entrance-gates, the porter's lodge, and the pleasant residence of M. le Directeur, the sides are bounded respectively by two great detached stables, four in all, with on one side the centrally situated coach-house, on the other the saddle and harness room; the opposite end being open to a far-reaching landscape. On the outer side of the right-hand blocks of buildings there is a long broad road, up and down which the horses are trotted when shown out in hand. Beyond again, and far off, are the shoeing shops and other offices, but planted out, and all arranged with characteristic taste, grass and flower-beds interspersed with trees and *bosquets* together forming an agreeable and well-kept pleasure-ground. The buildings, of white rough-cast, with solid granitic stone-dressings, are most substantial, and very spacious. The horses stand in the four

great stables in stalls head to head, clear of all walls, and against a central screen high enough only for the purpose of absolute separation; over every horse there is painted in large characters his name and breeding. The two ranges of stalls are bisected by a broad passage. There are also in each stable four corner boxes for the more valuable horses, and more boxes, for cases of sickness, are placed outside the left block of buildings. The stallions are carefully and most methodically classed and grouped; being treated with gentleness, they are gentle; and are systematically used for riding or driving, and regularly exercised according to their several capacities. The stables are perfectly sweet and clean, not a wet straw, not an offensive substance remaining to be removed. We saw no brooms, or wisps, or rubbers, or stable tools left about; they allow at Lamballe one man to three horses—indeed, I never saw anywhere stables so nicely kept.

The establishment consists of the Directeur, M. Chambry—*un véritable homme de cheval*—a personal friend of Count de Carcaradec; a Sous-Directeur, M. Quincher; and two Surveillants—all members of an organised and specially educated establishment. With one of the Surveillants, M. de Salverte, we made great friends: he was sent to meet us at the station; he is well connected, and appeared to us to be a well-educated and most promising young man. Nothing could exceed the much appreciated courtesy and kindness in our regard of our most able host M. le Directeur. The working staff all told are some 76 strong fine men perfectly turned out—the *brigadiers* in black jackets, silver galloon, and forage-caps; the *pale-freniers* (grooms), smart in scarlet jackets and white overalls, over boots with spurs—all were exactly regulated, even down to the men who ran the horses, for we noticed these men had their chin straps down, so that there should be no distraction amongst the prancing horses from fly-away forage-caps.

All steeped in sunshine, men, horses, buildings, trees, and grass together formed a *mise-en-scène* so perfect as to suggest to my mind the idea of some beautifully painted peepshow—that I was looking through a powerful magnifying-glass at some wonderfully constructed working model.

The horses are all secured in a manner I never have seen before; it is excellent and noteworthy. A centre post of iron shaped like a tuning-fork, or a post of wood and iron, having in either case a central and vertical slot, some two fingers wide, extending from near the ground up to within a few inches of the under-side of the manger. Up and down this slot the fixed end of a collar shank works easily and noiselessly in the follow-

ing manner. The collar shank, said by the Directeur to be made by the grooms, is of several pieces of leather doubled and sewn into two iron rings; the whole length of the collar shank is about or over two feet; one ring takes the collar billet, the other ring near the manger end takes the end of the shank, which is thickened with a leather pad to fit the slot, and sewn round a barrel button, or toggle of hard wood such as those on signal halyards. The toggle is passed vertically through the slot and turned horizontally, thus effectually securing the horse, allowing in the most simple and safe manner the usual freedom, together with the absence of all noise, and absolute ease, in case of fire or other necessity, in setting the cast or struggling horse at immediate liberty. The experience at Lamballe is altogether in favour of this simple arrangement.

The horses are said, one with another, to cost the administration 120*l.*, and all charges included 160*l.* a year. This would make the annual cost of the whole establishment 32,000*l.* a year. The ration I understood to be:—

Hay	.	.	.	.	.	.	.	.	.	4 kilos
Straw	.	.	.	.	.	.	.	.	.	6 „
Corn (oats)	.	.	.	.	.	.	.	.	.	5 „

This is more than the cavalry allowance, which is:—

Hay, 3 kilos, = about	.	.	.	.	.	.	.	7 lbs.
Straw, 5 kilos, = about	.	.	.	.	.	.	.	12 „
Corn, 4·20 kilos, = about	.	.	.	.	.	.	.	10 „

All the stable-forks are of wood; steel is considered dangerous. The grooming, considering the object, was good, not a stain to be seen on any one of the many white horses. The horses were all in fresh condition and appeared healthy. I only noticed one case of a starey coat; there were three cases of an affection of the legs resembling mud-fever, but which I took to be of a greasy nature.

Here may be seen sires, and sons, and grandsons, but the sequence is not invariably in the direction of an encouraging improvement. In the streets, and about everywhere during our tour in and round Brittany, we were on the look-out, but I am bound to say we did not see the workaday horses stamped in legible characters “Transformation of Type.” This may be that the best stock leave the country through the many horse-fairs and markets; any way, the fact remains, except a few at the Dinard Races and about Dinard, I have seen few native-bred horses of improved stamp. The infantry officers’ chargers at Dinan were a poor scratch lot, Barbs, weeds, and cart-horses; the regimental train horses that I saw after the manœuvres

were low in condition ; but there was generally nothing in them suggestive of quality or care in breeding.

"This stud at Lamballe is rather a Noah's Ark" is the idea that first crossed my mind when after our visit I began to collect my jumbled thoughts ; and the idea may be well excused on reading the following note of the various races, mixed and pure, so kindly exhibited to us. But, as suggested at the outset of this paper, and as will be further shown in the sequel, there are doubtless good reasons for the selections ; a knowledge of the characteristics of the peasant-farmer breeders with whom they have to deal, local tastes, demand and supply, and climatic and geographic considerations have influenced the able men who direct the State Haras establishments. Their aim and object are said by authority to be—as to sires, to bring home to producers the best models ; and as to produce, to encourage by local shows and prizes. Certainly I hope it may not be said of me that I visited and observed in a hypercritical spirit ; I saw a great deal to admire, and much more I wished to admire. I would not have it thought of me that I am only another exemplification of the imputed English aversion for all that it does not create.

We were shown English thoroughbred stallions, Norfolk trotters, Percherons, white, black, and iron greys, and some with a coach-horse or other cross ; Bretons, pure and half-bred ; Norfolk Bretons, Normandy horses, pure and half-bred ; Boulonnais horses, the typical heavy horse of France ; Vendéans, black with white, as I thought more set and hide-bound than Bretons, less of improvers ; Arabs, French Arabs, and Arab half-breeds. We must remember in justification of my Noachian epithet that all these variously bred horses, 200 in number, are kept, not as curiosities *à la Barnum*, but for practical stud purposes.

The stronger horses did not show much hair on the legs. We were shown one dark grey horse with a supernatural white mane down to his knees—he looked like a horse cut out of a Rubens picture—and we understood that such an appearance of hair is much liked. The horses generally appeared sound in wind, and there was no ring-bone or side-bone, diseases so sadly prevalent in England ; the feet, however, were often very faulty, in some cases contracted—nay, absolutely deformed. "Ah !" says M. Lemichel, "he who three hundred years ago invented the present system of horse-shoeing little thought of the evils of which he was to be the source." I noticed under treatment one case of sand-crack. It is said that in Brittany young horses are too much kept housed ; yet on our tour we did see horses running in nice, firm, undulating pastures. With iron fittings

there was yet a considerable detachment of crib-biters. The action of the horses generally was hardly equal to their shapes; in some instances we observed nice all-round action, in many cases good hind-leg action; sometimes the action was extensive, sometimes lofty, sometimes speedy, with a straddle of the hind-legs; there was often a dish, or throw outwards of the fore-feet—on the whole, I rather thought there was a general absence of that everyday harmonious action which on a hard road makes the real ring of pleasant rhythmic music.

As to general conformation, we saw many horses with shoulders running into their necks, consequently having an ugly long-bodied look, often accompanied with short or slack back ribs, or both; many, especially the stronger kinds, with round pulpy-looking legs and joints, suggesting outwardly inward softness of bone—firm flat legs and bold clean joints were especially attractive when occasionally observed.

The equine population of Brittany, including the four departments, is put at 300,000, or one-tenth of all the horses in France.¹ The Breton race is said to prevail in forty-seven departments, Breton blood being infused in half the horse production of France; in the last century an Arab and also a Danish cross prevailed. The Bretons are divided into two families, little and big, according to position and food, for a little bit of corn does wonders in changing the constitution of these pricked-eared, small-eared, round, short-quartered little beasts. There are far too many small horses that could not carry even a light dragoon. The famous race du Conquet are 15.2 hands, and near Lamballe Bretons are often 15.3 hands in height. The great object is, of course, to bring this valuable race of all sorts up to an even level—they have a great affinity for blood—but difficulty as regards elevation arises also from the sale of all the colts.

The real Breton horse of the country, untransformed by the influence of any Haras, and as seen at work in the most out-of-the-way districts, is of a real good sort. Here is a type drawn from nature: a little square-framed stallion, 14 hands high, bred near Cornouaille, in the Carhaix district—the most unsophisticated district of ancient Brittany; there you see in perfection old timber houses, and people more old-fashioned than their houses. This little, countrified, near the ground, well-limbed horse had a cheerful expression and lively pricked ears, much skin, little flesh, and no end of bone; he thrives on scanty food, "*Le cheval qui mange de tout va partout*" (the horse that feeds goes where he needs); according to his driver,

¹ Gayot, p. 261.

the little Bidet is "indefatigable." He runs 30 or 40 miles for days and days, and comes in nearly as cheery as he started. From 12*l.* to 20*l.* English is a fair price; 14 to 15 hands the height; but for this little working stallion in question his appreciative owner would hardly like, at five years old, to take 20*l.* Clearly, wonders with this native breed could be effected by judicious and pertinacious selection from within; but as compared with other races and methods, say the production of a ton of flesh and fat and bone in a single skin, the general improvement by selection within the Breton family of horses would certainly not pay?

The Bidet, like his owner, must soon be improved beyond recognition; all things tend to a common level; the little Bidet, like the English pack-horse, has had his day. New ideas, new requirements, must convert the Bidet into the large active horse of commerce or war. The native light horses will not be improved from within by selection, but by crossing, first the Norfolk Breton, and then again something larger. The half-bred horse will be used on the native mares of the smaller race, and the thoroughbred on the heavy mares; all evolution tending to one level. The varieties of the horse in the Haras must undoubtedly make administration exceedingly difficult: in wholesale crossing with cross-bred animals the results are necessarily of an altogether uncertain and very fluky nature.

The following is an illustrative sketch from the life of an accidentally encountered primitive race-meeting—showing the Breton people, like the kindred Irish, have really, though uncultivated, a natural taste for horseflesh. The scene of action was near Point du Raz, Finistère, a bare Moorish country. A three-mile course, on a flinty road, began uphill and ended in a village; this course was singularly unimproved by two turns, one at right-angles, the other a dog-leg. The way was lined throughout with interested spectators. The plucky little competing horses, natives, greys, and chestnuts, and altogether uninfluenced by the Haras, were bestridden without saddles by huge riders without shoes (*sans sabot*), who, whether galloping or trotting, extracted pertinaciously the best pace from their ever-willing little coursers. "*Allez! allez!*" and away they go, amidst clouds of dust and a shower of flints, up hill and down dale, pell mell into the village. Here all the horses "pull" the riders, and under the sun there was at least—an honest race!

My selections at Lamballe as noted are these: *Charbonnier*, black Percheron—a mixed and fixed race, much crossed, Arab, English, and Breton, and nearer blood than any other common race; a remarkably compact horse, with a sweep of shoulder that

made a strong back appear very short, this horse is round as a beer-barrel, and of a real good sort, suited admirably for van or omnibus. A corresponding mare should produce to a thoroughbred horse an admirable trooper. A black Percheron—we saw quite a troop of them—was as rare as a black swan; all the best families are grey, but authority ordained a change of colour, and, as breeding is costly, the breeder fell in with the fashion; this took time, as it was said, with apparent truth, horses do not change their skins as people do their chemises! Make, the French say, the black to sell, the white to keep—“*pour vous et pour la patrie.*” *Parfait*, a white Percheron, with the fine grey skin of the East, and there are many of them; this old horse realises his name, has perfect shapes, and is considered a typical horse of his admirable and world-famed race—*honnêtes et laborieux*—the horse of all work—*le cheval à tout faire, à tout faire bien*. Everywhere a winner, *Parfait's* portrait was published when he was exhibited at Paris. We did not see him out, probably being old he was stiff. *Danube*, by the *Rake*, a nice little short-legged English thoroughbred, well calculated to get half-bred stock out of country mares of size and substance. *Chéri*, a bay half-bred Breton, four years old, greatly took my fancy; a long, low horse, with substance and symmetry, breadth of loin, bone, and firm flat legs, the appearance of underneath length being gained by an admirable backward sweep of the shoulders; for any and every purpose an animal of a generally good and very useful sort—exactly the equine target at which Breton breeders should aim. *Basque*, by *Trocadéro*, a thoroughbred, is an example of the vicious system, which also so unfortunately prevails in England, of breeding from fashion and performance. It seems, from a list of victories hung near, that *Basque* was a famous steeple-horse, the sum of whose winnings amounted to some 230,000 francs, or 9,200*l.* in English money. For all this, a velocipede of a beast like *Basque* is hardly the sire to choose for getting half-bred horses in any country. *Lancastre*, an old horse of 24 years, was pointed out to me as a typical Normandy horse; he had the legs of a colt, with tendons clean as fiddlestrings; he was said to be of the finest Norman strain, which I understood to be *Noteur* blood. *Sénégal*, a half-bred Norman, was worthy of observation as a nice horse for all ordinary purposes. The other thoroughbred horses I remember are *Marin* by *Sting*, and *Corlaix* by *Flying Cloud*. If I remember rightly, this last was considered the show horse—and justly perhaps, for within himself he is a nice horse that one would like to ride in the Park; but I may be excused if, fresh from the grand exhibition of selected sires at Newcastle,

and with them in my mind's eye, I thought the thoroughbred horses at Lamballe the least interesting section of that great stud.

It is only fair to observe, however, that the Ancien Général-Directeur des Haras draws a beautiful and appreciative portrait of the English thoroughbred horse, admiring "the plenitude of life to be seen in one of these masterpieces of creation." Pure English blood—*voilà le mot lâché*—is his best factor, his first element; as for the dam—*quant à la maman*—"intervention de papa et de maman"—"choose from the best," and "*maries entre eux les produits*"—"good blood knows not how to lie!" There was a considerable range of dark iron-grey Percheron horses, with white tails and manes—this dark colour is said not to change with age to white; these dark horses are avowedly kept to please the American taste and trade, very large sums are paid for them, and they are greatly in demand. The English Norfolk cobs of the heavy type are well adapted in substance, shoulders, and legs to improve by amalgamation with the native mares—to form a distinct race recognised officially as Norfolk-Bretons. The Norfolks were introduced into France in 1850, under the directorship of M. Gayot; he calls them splendid, incomparable—his aim draught more than saddle. "*Le trotteur que je vise, entendons-nous bien, est cheval de trait, non cheval de selle,*" a draught-horse with a dash of blood. I noticed the following Norfolks: Sir Richard, The General, Old Times, Lord of the Manor, Sir Georges Wowmbell (*sic*), Blackfireaway, Norfolk Hero. If these seven horses are not of the very highest quality, they are useful animals, well adapted and judiciously selected; their feet appeared shapely and sound. I have a note that there is a little wanting in the fore-ribs of "Sir Georges Wowmbell"!

Not the least interesting episode of a most interesting day were two stallion teams shown out in harness and admirably driven; the coachmanship was really excellent. There is at the Haras Du Pin a free school where instruction is given in regard to coachmanship and every other detail relating to the management of horses. We were sent to the station in a break drawn by two magnificent stallions—Anglo-Normans, I think—a pair of state or town carriage-horses, that left little or nothing to be desired either in regard to shape, substance, manners, or action.

One of the perfectly handy teams so shown out was of lighter horses, three brown Bretons and one black roan Norman half-bred, stallions; the off leader had really remarkable, extensive action, and all were shapely and well-matched good goers.

The second team, all chestnuts, were of a stronger kind of Breton horse—*cheval de poste*—in characteristic and national

posting harness, such as I have seen at Paris in the days of the Empire, and perfect of its kind—the traces of black rope, the horses' tails twisted up and laced, with jingling bells, and, attached to the bridle head-bands, fox-brushes for fly-flappers. The horses were square-made, active, and altogether of a most generally useful sort; with round, lofty, energetic action, and with a little more freedom in going to get them away, these admirable horses would have been absolutely perfect for everyday work in their undulating native country, or for extraordinary exertions anywhere in the armed service of *la Mère Patrie*.

I took leave of my kind friends at Lamballe with many expressions of appreciation and obligation; and I have no doubt the kindly feeling was mutual—indeed, I heard afterwards that it was said in a letter from Lamballe that by the observations and selections of the Englishmen they, the authorities, were—the expression is untranslatable—“*tout à fait épaté*”! I then and there fully determined to study further the influences of the establishment which had interested and instructed me so much, and generally to follow up the subject of horse-breeding in France.

On subsequent reflection I am strongly of opinion that a Government Haras system is not adapted to our needs and requirements: such an establishment in England would be killed outright by scathing criticism. Indeed, the French themselves say¹ the English have the best Haras in the world—they belong to private gentlemen! I have nothing but admiration and appreciation to express in regard to the great establishment I was permitted to inspect; there was zeal and devotion, with knowledge, resulting in success—that is to say, success estimated by an outsider, and according to a French standard. Anyway, we have in England—as regards our State and Society stallions—one important lesson to learn from my kind friends; Monsieur le Directeur and his subordinates are unwearying in their successful determination to follow up and to be fully acquainted with the produce of their two hundred sires, the growth of that produce, its promise, and its achievement.

Some time afterwards the Comte de Carcaradec was so good as to write to me from his Château de Kerivon, près Lannion, Côtes-du-Nord, telling me of the great horse fair to be held at Morlaix on October 15—“*une des plus belles foires de Bretagne*.” He hospitably invited me to visit him at Kerivon, and promised to accompany me to Morlaix: the Count was altogether a most pleasing example of that international friendship which on every account it is so desirable for all of us to cherish. There I was introduced to the country gentlemen at the rural club, where,

¹ *Dictionnaire Universel*. Paris: Hachette, 1859. Art. “Haras.”

as in Scotland, all appeared kinsmen—"if not of kin, they were at least most wondrous kind."

To Kerivon and to Morlaix I travelled through a beautiful and all undulating country, well wooded and timbered, and variously and beautifully tinted by the effects of early autumn. Hedges with hedgerow timber, and banks topped with fantastic trees, lined out small grass fields full of cattle and sheep. There was unfolded to me a panoramic view of picturesque beauty—smiling pasture-lands, rocky ravines, rolling landes, wooded dells, the sheen and the splash of the brawling upland torrent, and everywhere the yellow broom, the plant of the country, the *genêt*, suggesting the badge and the name of our Royal Plantagenets. Not far from Morlaix, at Roscoff, there is most splendid early vegetable land at a fabulous annual rental, and well worthy of a practical Englishman's study. The editor of the recent edition of Arthur Young's *Travels in France* calls Brittany "the grainery of France and the market-garden of England"—I do not exactly see the grainery, but I fully recognise and desire to call attention to the English market-garden.

The considerable and increasing vegetable trade with England has established a weekly communication to and fro between Morlaix and Weymouth; I understand the passenger accommodation is not very good. Morlaix may be conveniently reached also by St. Malo, and rail from thence, or from Havre by sea. No horse or animal can be embarked in France without a certificate of soundness, which costs sixpence; the all-inclusive cost of sending a horse from Morlaix to Cardiff was said to be some forty-five shillings.

Wolves, until quite recently, were common in Brittany, but civilisation and strychnine have improved them from off the face of the earth, to the great regret of an ancient wiry little old French baron, the *premier chasseur* of Brittany—at the rural club I was presented to this celebrity. His hounds were of a bloodhound cross, and he himself, he told me, always bestrode an English thoroughbred, in his opinion the best mount in the world. After an excellent dinner, washed down with Algerian claret, the old sportsman gave me, with much gusto, a charming vivid and pantomimic description of a wolf hunt, including an all-fours representation of his hounds, together with a barking chorus.

Before climbing the hill to reach the high ground above Morlaix, on which the fair is held, a few observations in regard to the men and horses of the country may not be out of place. First as regards the horses, there is no question as to the endurance of the little horses of the country; they, many of them, of all

Napoleon's horses, survived the hardships of the retreat from Moscow. The little *bidet d'allure*—the riding-horse is thus named—would be admirably suited for mounted infantry; but as regards the cavalry charger (*cheval de guerre*) Count Andrassy's memorable observation should not be forgotten—a big man requires a big horse to ride, not two small ones. Mr. Curmac, an American gentleman of fortune living in the country, told me two little horses of twelve hands ran him in a large carriage, out and in, full eighty kilos. (fifty miles), and came in as though they had done nothing. Mr. Talbot—a most agreeable and intelligent man, of whom more hereafter as an agent in the English vegetable trade, and who has been sixty years in Brittany—drove two of these Bidets, in and out, sixty miles; they were never taken out, they were not tired, and would do the same thing two or three times a week. Two little entire horses, thirteen hands, ran a heavy diligence at a rattling pace, and without any recourse to whipcord.

No doubt this little Breton horse is the parent of the enduring Canadian pony, the delight of my youth; the Habitans and their horses originally hailed from St. Malo, and in my day in Canada one of the most favourite of the Canadian boat-songs was "*A Saint-Malo, beau port de mer.*" You rarely see in the Breton horse really good action, there is something wanting in all; like the Canadians, they often run. There are many bad feet, and universally there is bad shoeing; bad collared horses are unknown, the foals, from the first, run with their dams in harness, and are afterwards made to draw with a long halter arranged lasso fashion. It indeed requires many successive and educated generations, one pushing on the other, to succeed in any art, and to me it was almost pathetic to observe the strenuous but desultory attempts to arrive at an even level of good horses amongst a people who have little knowledge, and no cultivated taste, and perhaps no established standard to work up to—they mostly aim at nothing, and generally hit it.

Morlaix as a centre is *vraie Bretagne Bretonnante*, an ancient and time-honoured appellation which distinguishes the Celtic as opposed to the French-speaking Brittany, or *la Bretagne douce*, and if I found the horses a mixed lot, what am I to say of the horsemen?—a mutton-hating and buckwheat-eating people, who drink, but not to drunkenness, crude cider corrected with potato-spirit. I met Breton-speaking men from the hills, the backbone of the peninsula, which are never higher than 1,200 feet—men from the so-called Black Mountains, with shaggy locks hanging down their backs mane-like, clad summer and winter in the shortest of goat-skin jackets, suggesting Robinson Crusoe without his

man Friday. Others I saw in light drab homespun jackets, with capotes, and baggy "breeks," spare-living, active, and hardy men. Then I encountered real typical Celts—stage Irishmen, to the long-tail coat and old clouted breeches, only with sabots instead of shoes. The well-to-do yeomen from St.-Pol were pleasant to behold—tall, rich, burly men, and well nourished, in costumes of the best materials, blue sash, and expanse of white shirt in lieu of waistcoat, and wideawakes with great buckles and long strings; all these, with many other quaint and showy garbs of old Brittany—together with the woman-kind, who are always nice in their great white Breton coiffures—we must carry with us in our eye when we get to the fair. These old-fashioned, virtuous, and loyal people are devout, a strange jumble of Paganism and Romanism, influenced to this day by the Druidic remains to be seen on every heath—the Menhir, the Dolman, and the Galgal, the upright stone, the table-stone, and the barrow all over the place: how these huge stones got there, sometimes in thousands, no man can tell; these Druidic remains are not more numerous than are the more modern pardons, and wakes, and Calvaries, and mystery plays. To this day in the Breton language they always reverently say that which is equivalent to *Monsieur Dieu* and *Madame Marie*.

I go into these matters in some detail as I would interest and induce a practical study, not of the horses only, but also of the vegetable-farming for the English market. The English agricultural vegetable prospector might by chance be entertained as well at Morlaix with one of those mystery plays still common in the country—say, Saint Tryphine and King Arthur, in which Arthur, King of England, he of the Round Table, appears guarded by baggy and red-trousered soldiers of the 148^{me} Regiment of the French line; or the Englishman may accidentally find himself at a ball in the market-place, and see mettlesome jigs danced to the "skirl" of the bagpipes.

Morlaix, the cradle of the Breton family of horses—*la famille Bretonne*—is picturesquely situated *à cheval* of the tidal river, which is lined with quays and curious quaint timbered and carved houses overhanging the narrow streets, behind which the hills and rocks rise steep and woody. Arthur Young described Morlaix as romantic and beautiful. It is market-day, and all sunshine; the streets are so blocked by good-natured, but most loquacious, men and women in the aforesaid varied costumes, that it is difficult, with an endless procession of prancing horses, to make our way up a steep hill to the ground on which the fair is held. Behold! Rosa Bonheur's picture of a horse fair!—as a commercial man might say, Rosa Bonheur's picture as "a going concern." Four large enclosures were

crammed with horses, and, besides, all the roads around were full to repletion, a sort of Falkirk Tryst of horses. As to an estimate of the exact number, Mr. Talbot, writing to me under date November 30, 1887, says: "As to the number of horses at the Foire Haute at Morlaix on October 15 last, 4,039 horses passed through the town and paid toll (*octroi*); but this does not represent half the number at the fair, as the majority came from the country north, east, and south of Morlaix; competent judges estimate the number at not less than 10,000. During the Monday, Tuesday, and Wednesday over two hundred waggons, with an average of eight horses each, left Morlaix Station for various parts of France and Spain."

To return to the fair, which generally was characterised by a want of finish about every equine production, the most valuable horses, and the appreciative connoisseurs, such as the Comte de Carcaradec, M. le Directeur from Lamballe, my friends of the rural club, and others, were gathered together under the shady trees of the first enclosure. A horsey French gentleman at a horse fair is invariably armed with a *bâton Normand*; this is a stout tapering stick held at the thinner end, which is furnished with an elaborate leather handpiece, with a wrist-strap; this *bâton*, when the soothing "*Oh là ! Hiïï !*" has failed to charm, is for protection against the charges of the more sportive horses, which sometimes conduct themselves much in the style of the Blondin donkey of the music-hall stage. Elsewhere I certainly saw some grand heavy horses of the Boulonnais and Percheron type, but these were the exception; the rest were rough unshapely little Breton Bidets—mediocrity in abundance—a great mass of unleavened horseflesh, with here and there something rather risen.

All, or nearly all, the horses we saw were from two and a half to three and a half years old; there were, however, many foals, and all hog-maned. The prevailing colours were grey and chestnut, with a few roans; the roans and skewbalds are said to sell best; the Count told me dark chestnut (*queue et crin lavés*), with white tail and mane, is much the fashion. Some of the horses were in glowing condition; all the superior ones fat and fresh, but bad feet everywhere; the better horses had excellent dealers' manners, stretching out in true Yorkshire fashion. All the low dealer's tricks appear to be well known in France, dark and hot stables and cooked grain, "spicing," punching, wedging, and blowing, they say "*Le Maquignon tromperait son père.*" A coloured *filet* is invariably twisted into the tail, and when a sale is effected this is pulled off and retained by the vendor as a trophy; in many cases the colour of the *filet* betokens a winner in the *Concours régionaux*—a local agricultural show encouraged

by Government and the Haras. The good-natured people, on inquiry, always produced to me, and without hesitation, the indispensable *carte d'origines* which by law they are bound to carry; this is a Government certificate of the horse's breeding and other particulars, together with a description for identification—most valuable for a purchaser.

The question naturally occurs how far could be traced the influence of the Haras in the horses exposed at the fair; and how about that crucial test of tests, the prices obtained? Allowance must be made for one disturbing influence, no doubt; as with us, many valuable horses never come to the fair, but are sold at home. For example, I made friends at the club with Monsieur Gustave Adolphe de Katienguy, who had just privately sold to the Haras for its purposes three entire half-bred colts by Corlaix—Corlaix by Flying Cloud, a thoroughbred, and mentioned as having been seen at Lamballe. As a further illustration I quote from the Report of the Compagnie Générale des Omnibus de Paris for 1887: "Horses for the company are bought in markets and fairs, but a large number are obtained by dealers visiting the breeders, and purchasing the animals to be delivered at certain dates, a process which is very convenient to the company, and at the same time ensures certain sales for the farmers, and renders them in a degree independent of the markets and fairs. Horses, in common with other agricultural products, show a serious and progressive depreciation in value since 1880; animals worth 5*l.* in that year being now obtainable for 37*l.* 10*s.*" Every good Percheron is at once snapped up by the Americans. Mr. Talbot, with sixty years' experience, told me superior horses used to be sold at "1*l.* per leg; now, since the Haras has been established, and for thirty years, 5*l.* a leg" is an average price. The price of a Bidet little saddle-horse of the country, 10*l.*, perhaps 12*l.* for a pair; I understood these little horses are exported to the West Indies. Mr. Talbot told me he knew a farmer the possessor of a mare with a head like a coffin; the mare was put to Haras horses, and during thirteen years she gave the farmer produce which paid his rent.

Mr. Talbot further mentioned the following circumstance as an illustration of the system:—A farmer of his acquaintance had an excellent five-year-old brown mare which he positively refused to sell. Asked the reason, the farmer replied, "The mare belongs to the army [*remonte*]." He went on to say, "I admired the mare, and the colonel commandant said, 'If you want the mare for breeding you may have her for 50 francs; sign the paper and keep her; she must be shown twice a year to the Haras agent, and covered by an approved horse at 5 francs'; under this system, after ten years the mare is retained as the

absolute property of the possessor. The farmer had five mares on the same terms, and used five different sires.

The prices at this fair were considered bad, owing to a scarcity of hay and roots. Foals by Haras horses were sold for next to nothing, or given away; three good-looking and sound colts at six months were sold at Plouaret for 17 fr. 75 c., or rather less than 5s. of English money each. I saw in the fair a nice roan colt, well-grown, and by Bronze, a horse of the Lamballe Haras, sold for 80 francs, or about 3*l.*; the owner cried out that it was given away. I made friends with a Welsh vegetable merchant, who also did a little in horse-dealing—a pleasant, clever, very practical man. I was with him when he bought a black mare (16 hands 1 inch) for 32*l.*, and a brown of same height for 25*l.*—both strong useful van-horses or trappers; altogether he bought eleven horses, at 18*l.* to 20*l.* each. Four nice chestnut geldings of 15 hands 2 inches, a match team, went to Paris; my friend the vegetable man had been bidding for them, he turned round, and the horses were sold for only 50 francs over his bid, they sold for 30*l.* each. A grey that matched the before-mentioned black, a stepper, sold for 500 francs. The Welsh dealer told me that the year before he bought at St. Malo a Norfolk-Breton for 30*l.*, and sold him in Wales for 99*l.* for trotting races: the Norfolk-Breton could do, he said, a mile in 2 min. 35 sec. I much admired the Norfolk-Bretons “*du Finistère*,” near the ground, compact little horses. I saw a nice pair of them in harness at Dinard Races. “Charbonnier,” the admirable black Percheron Haras stallion before mentioned, was represented within my own observation by two mares—one, the dam by a Percheron, was sold for 36*l.*, and cost at three months old 12*l.*; the other was a great lumbering half-Boulonnais blue roan, I did not see her sold. A fine black mare by “Fire-King,” dam a Norfolk-Breton, sold for 32*l.* I examined a good mare by “Veneur,” by “Lozenge,” dam by “Grey Shales,” not quite straight in the fore-legs as you met her. There was a great big fine heavy mare by “Fire-King” seven years old; she had four foals, and wore a lot of medals; her value said to be 85*l.*, but this I question. I noticed a grey carriage-horse, a little long in the leg, by “Tregarvon,” out of a Norman mare; 34*l.* was asked for her. I need only further mention a nice square-made cobby horse by “Sir Richard,” said to be worth from 20*l.* to 24*l.*, and good value for the money. “Men speak of a fair as things went there”; to my mind the whole fair suggested that which is a fact—the Haras and its influences, notwithstanding all the best horses outside the Haras are drained out of the district, and many of them out of the country,¹ and that the mass of average

¹ The following table, showing the importation and exportation of horses

own; at this moment in France the English horse is the fashionable horse, the "*cheval de luxe*" as opposed to the *cheval sérieux*."

There is, says M. Gayot, an incessant march of all horses towards unification, a tendency towards uniformity; in other words, this is, in action, the great and prevailing law characteristic of our day, a law evolved from steam transit and the breaking down of barriers all over the face of the earth. Roads were made, and—the survival of the fittest—horses had to be fitted according. With this century the pack-horse and pad gave place to the heavy waggoner and machiner. Again, railroads came, and the big horse had to be replaced by a bigger variety; one great need of our day is fitness to draw heavy loads with satisfactory speed; in narrow, crowded, commercial streets the strain must fall on a shaft-horse. The weight of the big horse seconds his energy; the animal machine, says M. Gayot, is a bag of levers and requires a fulcrum. Climate and food also conduce to make the big horse, clover cultivation and artificial grass have had a good deal to do with him; these equine mastodons flourish on luxuriant herbage. The big horse costs much to produce and much to keep. M. Gayot—and I heartily agree with him—is strongly averse to too big a horse, and complains of the "voluminous" Belgian stallion that melts like butter in the sun; the fine old heavy cavalry horse has been transformed by the influence of roads to an elephant. Improved agriculture must have improved horses, and M. Gayot has much to say in regard to the *cavalerie agricole*; the Boulonnais is his type of a perfect heavy horse. In 1825–26, the omnibus first called for the light draught-horse, alive and going, active, strong, rapid. M. Gayot appears to advocate a fusion between all the varieties of the cart-horse—France, he says, is especially adapted for the production of heavy horses and of harness horses; the Americans, according to M. Gayot, say the French cart-horse is the best in the world.

The Boulonnais, as we know, M. Gayot considers the most perfect big horse, but really the Boulonnais is only the big Flemish horse which has stepped over the frontier. The big French horse was originally black or bay, but from constant crossing with the Arab and Barb the Boulonnais colour is now roan and grey. It may be questioned whether this big horse, if exhibited in England, would make any figure when compared with his distant but undoubted relations. All horses, according to M. Gayot, are divisible into three classes—the light, the heavy, and the intermediate horse; the Arab, according to him, is the perfect light horse. M. Gayot, as has been already said, has a due appreciation of the English thoroughbred stallion suitable for the purpose of getting half-bred stock; but I cannot help

thinking much of the prejudice in France in regard to "blood" arises from the false impression entertained by many of his countrymen as to the English thoroughbred: the Anglophobist usually figures to himself a narrow, greyhound-like slip of a beast—a broken down, fifth-rate, light-weight racehorse. The views of the Anglophobist would probably be altogether changed if he could realise to himself, as I do, the robust proportions and the masculine beauty of such a grand old horse as "Vol-tigieur." The type of the intermediate horse is certainly the shapely Percheron. A Percheron-Breton cross was tried and failed; on the other hand, as we know, the English blood in the Norfolk-Breton union is an admitted success. M. Gayot is justly very proud of the admirable native breed, *du Perche*. It would be cruel to raise any question when he says, with a smack of unconcealed satisfaction, "The English envy the Percheron, and so happily gratify our French national pride"—"*un sentiment d'envie que savoure avec bonheur notre patriotisme.*"

The French experience in Algeria—a comparatively recent experience—is most instructive; there, within the memory of many, the laws of extinction of race, and survival of the fittest, and so on, may in action be clearly traced. The old, old story: the European never came to Algeria to continue Arab civilisation—but to colonise—that is, to reduce the general conditions to a common European level. The French found the Barb horse so good and useful, a race pure and undefiled, the very horse that made the French *cavalerie indigène* famous; and now that famous race has been, or is being, rapidly improved off the face of the earth. All sorts of horses of all kinds have been imported—mares of at least seven French races, and the army aided in the general fusion by cast mares of the artillery; omnibuses, for example, followed the hotels and railways; vine cultivation requires a single strong horse to cultivate between the vine rows. Those Easterns were without doubt consummate horse-masters; M. Lemichel quotes the beautifully humane Arab proverb: "When thou canst—walk me along—so that my gallop may save thy head in the hour of need."

The military horse at any given moment might be the safeguard of the nation. M. Lemichel likes a medium-sized horse for the cavalry. M. Gayot says we cannot doubt many cart-mares are well adapted to produce the *cheval d'armes* if put to a blood-horse; again, the cart-mare put to a half-bred horse produces a good horse for the army. The Hungarian horses purchased in 1867–68 were said to be inferior and delicate. It is well known the late war with Germany alarmingly reduced the stock of French horses adapted for military purposes.

The Haras, says M. Gayot, should only have the best horses, for keep is costly; its aim the light draught-horse, more or less heavy, but with action; an essential principle, however, is to extend the hand of amelioration to every element. The State intervenes because private purchasers cannot afford the expense, and obviously stud horses must be kept in the country; the French breeders are careless, and the foreign imports of stallions as a novelty are useful by awakening in the breeder some necessary interest. M. Gayot claims that the Haras has done much for the cart-horse, and generally it deserves credit for sowing the seeds of extended production. The Haras has many enemies and great difficulties; in France, what an administrator may propose, events and revolutions dispose. Much is hoped from the law of 1874, enacted in order to endeavour to secure continuity in Haras management: and from the incomplete and, as regards the owners, the somewhat hard law of 1885 regulating the use of private stallions. Then, as has been stated, there is an important party—Anglophobists—who say, “No State meddling,” desiring abstention from administrative intervention. I heard from many quarters, and M. Gayot with bitterness of feeling refers to the fact, that the last Empire, 1852–70, had an evil effect on French horse-breeding. The Jockey Club—*les turfmen*—gambled, betted, amused themselves, and intervened; all the cart stallions were ejected from the State Haras—a most disastrous abandonment—to make room for more English thoroughbreds and more Anglo-Norman half-breds. There are few large fortunes in rural France; the tempted farmer, poor and needy, sells male and female alike; he must have an immediate profit. Foals are pampered to please the Americans—cake, milk, phosphate of lime, dried blood, and that sort of thing. The French cart-horse is endangered by the Americans, who are omnivorous; they give great prices, they take everything, colts and all, and the French Government even cannot compete with these Americans.

Well may M. Gayot say there is no need to battle further in favour of the utility of published records of origin—*les livres d'origines, le stud-book*—the thing is now understood, the battle is won. The French Draught-horse Society of America have a Stud-book—“Le Stud-book Percheron Américain,” “The Stud-book Percheron Normand-Américain,” the National Norman Horse Association. The French Percheron Stud-book failed, but American dealers took it up again and blew it out with trade puff. The Americans, M. Gayot says, insist upon a false Percheron; the American Percherons are now no longer *bons chevaux*, but *gros chevaux*. Arab pedigrees have for long in France been carefully preserved; the English Stud-book followed, it is

said, at a long distance. Then followed a French Stud-book, a record of Arab and English blood horses and mares imported.

The French do not inscribe the vulgar herd in their golden books, says M. Gayot, there must be something noble—mother races. He devotes a long and interesting chapter of his work to the Stud-book, and mentions many in existence and an important addition then promised—a general Stud-book for French cart-horses, to be taken up by the Société des Agriculteurs de France. In France, as in England, the feeling appears to be gaining ground—the horse-breeder, like the chemist, should be assured of the purity of his materials; or if he uses mixtures he should be assured of their purity, and the exact strength of the elements. M. Gayot suggests, in addition, a Stable-book to show the exact “dose” of English pure blood in the half-bred stock, and goes on to say the Stud-book and record idea has taken root and flourishes—“*l'idée a triomphé sur toute la ligne.*”

English horse-breeding, according to M. Gayot, is an art, not a science, and requires great tact; the English manner requires English tact, the art cannot be reduced to rule. Theories do not trouble the skilful English breeder; he observes, thinks, and conforms to his materials and his aim. In the aim is his power—he always knows what he wants, he knows better than we do what to expect from a given union. What might appear happy accidents to the superficial observer, are really and truly the fruits of the most judicious combinations of the most skilful practitioners; clever breeders are thinly sown everywhere, even in England. The English process is very complicated, it is not general in England, it does not always succeed; they admire good results, and do not talk of bad ones—*on ne va pas le dire à Rome!* It would be useless to recommend the English manner to an ordinary Frenchman, there is nothing in his nature upon which such nurture could stick. He works on a small scale and would not even try; you might as well ask him to take the moon with his teeth—*lui demander de prendre la lune avec les dents*; he employs the horse they bring to his door, he must have everything ready made to his hand or he will have nothing—creatures of habit they are, creatures of habit they will remain.

We have, then, visited the French Haras; we have, the better to understand it, attended the horse fair, and, to further understand both, we have glanced at the excellent work of the able, experienced, and candid M. Gayot; and in my view the sum of the whole matter as regards the Haras is this: the French horse-breeder is uninstructed and supine, and so leans upon his Government; the successful Englishman, on the other hand, is skilful, and full of self-reliance, and—say I—long may he continue so!—a lion in his own cause.

XXI.—*On the Value of the Oil in Linseed-cake as a Food for Stock.* By F. I. COOKE.

It is very well known that owing to modern improvements in machinery, and an increase in the value of oil, as compared with the large reduction in price of linseed-cake, the latter product contains now a less amount of oil than was commonly found in it a few years ago. A diminution in the percentage of oil in a cake is necessarily accompanied by an increase in the other constituents, and arguments have recently been advanced by German and other authorities tending to show that a cake low in oil may have a feeding value equal if not superior to one containing a larger amount of oil. On the other hand, many of our leading agricultural chemists have continued to put a much higher value per unit, for fattening purposes, upon oil than upon any other nutrients in a cake. Considering, therefore, this prevailing uncertainty, and the very large amount of linseed-cake used by the farmers of Great Britain, the present writer has long thought it a matter of the greatest importance to them that the question of the feeding value of oil should be accurately determined by practical experiment.

This view being cordially endorsed by the Experiments Committee of the Norfolk Chamber of Agriculture, the writer was authorised to consult Sir J. B. Lawes upon the subject. In answer to the letter Sir John Lawes expressed the opinion, that if all the necessary precautions were taken, he saw no good reason why such an enquiry should not be carried out with a fair prospect of success; and he most kindly consented to give the benefit of his invaluable experience and advice to that end. He further pointed out that the experiments conducted by himself and Dr. Gilbert upon the feeding properties of barley and malt were quite successful, although the subject was one of considerably greater difficulty than the experiment which the Norfolk Chamber of Agriculture were willing to undertake. Sir John also acquiesced in the wish of the Chamber that sheep should be the medium for the purpose, and advised that a considerable number, not less than fifty or sixty of them, should be employed, extreme care to be taken in their selection, so that if two lots of sheep were fed upon the same food, the difference, if any, in their respective increases should be reduced to a minimum. Sir John Lawes further suggested that the two cakes employed should differ very considerably in the amount of oil contained in them, and that if a cake sufficiently high in oil could not be obtained, steps should be taken to have one specially manufactured for the purpose.

Upon enquiry into the amount of oil in the best sorts of linseed-cake accessible to farmers it was for some time found impossible to obtain a suitable one for the experiments, and all attempts to get one specially manufactured were abandoned, after several failures from want of uniformity in the samples. Ultimately, by the kind assistance of Dr. Voelcker, the emergency was met by his reference to a pure cake containing over 15 per cent. of oil—the only cake, so far as we could learn, of this percentage in the market. On the other hand, cakes low in oil are not difficult to procure, and a pure one of this character was selected. Samples of both these cakes, taken constantly from the daily rations as actually given to the sheep, were from time to time sent for analysis to the laboratory of the Royal Agricultural Society, and the different analyses agree very well indeed. As a total result of them it may be accurately said that the experiment was carried on with two cakes, one of which contained between 6 and 7 per cent. of oil, and the other between 15·36 and 16·21 per cent—a difference, therefore, of from nine to ten per cent. of oil.

By kind permission of Mr. Garrett Taylor the experiment was conducted upon his farm at Whitlingham near Norwich, and much additional assistance was afforded by him to the committee, besides the great opportunity of selection from the produce of his large and well-known flock of pure-bred South-down sheep. A considerable number of ewe lambs of even appearance were first drawn out, when each of them was weighed, and a label recording its weight was attached to its neck. From these again were selected sixty sheep matching still more perfectly to eye and touch, and of pretty equal weights. This quantity was then so divided into two lots of thirty each that each sheep had, in point of weight, its almost exact duplicate in the other pen. Consequently, at the commencement of the experiment, the difference in aggregate weight between the two pens did not exceed two imperial pounds. Thus one pen weighed 26 cwt. 1 qr. 5 lbs., and the other 26 cwt. 1 qr. 3 lbs. We therefore started with sixty sheep singularly uniform in type, appearance, and breed—even if they were not closely related—and of practically equal weights, whilst all had been born almost on the site of the experiment, were of the same sex, and had lived together upon the same farm and the same food since their birth. Moreover, the breed is of the very best for making good use of its feeding opportunities. Besides the two pens of thirty each under actual experiment, some additional and equally matched sheep were next selected for two reserve pens. These were fed in exact duplicate with the experimental

sheep, and were weighed, &c., as the others, in order that they might be ready at any time to replace any of the latter which might be ill, or die, and thus prevent any interference with the original conditions of the experiment.

The food, which was given with great regularity to all the sheep, was linseed-cake, clover chaff of excellent quality—which, after the wet summer of 1888, was only obtained with great difficulty and expense—and cut swedes. Of the two former foods each sheep at the commencement of the experiment received $\frac{1}{2}$ lb. of cake, and $\frac{1}{2}$ lb. of hay daily. On December 31 the cake and hay were both increased to $\frac{3}{4}$ lb. of each substance per day, and this quantity was continued until the end of the experiment. The swedes were given *ad libitum*. The quantity received by the sheep was, however, carefully weighed throughout the experiment, and at the end of each day any unconsumed portion was weighed off and recorded. The sheep were penned widely, with abundant space, and side by side in a field very suitable for sheep folding, and after a fast of twenty-four hours were separately weighed at monthly intervals, or as near to those periods as weather permitted.

The experiment began on December 3, 1888, and ended March 25, 1889. During this period the two lots of sheep were in every respect but one treated exactly alike, the only exception being that one lot received more oil than the other in the cake given to it, whilst the second lot received, instead of the oil, an equal weight of the other constituents of the cake.

Tables I. and II., on pages 410 and 411, give the weight of each sheep at the beginning and end of the experiment, as well as in each intervening month, for sixteen weeks.

At the January weighing the wool of all the sheep was rather dryer than at any of the other recorded dates. On each of the other occasions the wool was damp, though not wet, but equally damp in the case of every sheep. This circumstance, however, is perhaps worthy of notice as likely slightly to depress the totals for January 28 as compared with those for other dates.

Only two sheep died during the sixteen weeks of the experiment, one in each pen. These were immediately replaced by one from each of the reserved pens, which had been receiving the same quantity and quality of cake, and which were of practically equal weights to the sheep they succeeded. Although the general results of the experiment will be best seen in Table III., it may be observed here, in reference to Tables I. and II., that while the total increase of the sheep receiving cake rich in oil was 1,148 lbs., those consuming the cake low in oil

TABLE I.—WEIGHTS OF SHEEP IN PEN I. FED ON
CAKE LOW IN OIL.

No. of sheep	Nov. 29	Dec. 31	Jan. 28	March 5	March 25	Total increase per sheep	Increase per sheep per week
	cwts.qrs.lbs.	cwts.qrs.lbs.	cwts.qrs.lbs.	cwts.qrs.lbs.	cwts.qrs.lbs.	lbs.	lbs.
1	0 3 14 $\frac{1}{2}$	0 3 24 $\frac{1}{2}$	1 0 2	1 0 11	1 0 20 $\frac{1}{2}$	34	2.12
2	0 3 21 $\frac{1}{2}$	1 0 1 $\frac{1}{2}$	1 0 10	1 0 20	1 0 27	33 $\frac{1}{2}$	2.09
3	0 3 5 $\frac{1}{2}$	0 3 16	0 3 23	1 0 4	1 0 13	35 $\frac{1}{2}$	2.22
4	0 3 20	1 0 2	1 0 12	1 0 26	1 1 5 $\frac{1}{2}$	41 $\frac{1}{2}$	2.59
5	0 3 15 $\frac{1}{2}$	0 3 26	1 0 6 $\frac{1}{2}$	1 0 15 $\frac{1}{2}$	1 0 23 $\frac{1}{2}$	36	2.25
6	0 3 21 $\frac{1}{2}$	1 0 4 $\frac{1}{2}$	1 0 13	1 0 23	1 1 5	39 $\frac{1}{2}$	2.47
7	0 3 12	0 3 20 $\frac{1}{2}$	0 3 27 $\frac{1}{2}$	1 0 9 $\frac{1}{2}$	1 0 15 $\frac{1}{2}$	31 $\frac{1}{2}$	1.97
8	0 3 7 $\frac{1}{2}$	0 3 13	0 3 20	1 0 0 $\frac{1}{2}$	1 0 7 $\frac{1}{2}$	28	1.75
9	0 3 12	0 3 16 $\frac{1}{2}$	0 3 27	1 0 8	1 0 16 $\frac{1}{2}$	32 $\frac{1}{2}$	2.03
10	0 3 20 $\frac{1}{2}$	1 0 1 $\frac{1}{2}$	1 0 10 $\frac{1}{2}$	1 0 22	1 1 1 $\frac{1}{2}$	37	2.31
11	0 3 18	0 3 23 $\frac{1}{2}$	0 3 27	1 0 16	1 0 25	35	2.19
12	0 3 6 $\frac{1}{2}$	0 3 18	0 3 23	1 0 8	1 0 12	33 $\frac{1}{2}$	2.09
13	0 3 10	0 3 19 $\frac{1}{2}$	0 3 24 $\frac{1}{2}$	1 0 4	1 0 12 $\frac{1}{2}$	30 $\frac{1}{2}$	1.91
14	0 3 13	0 3 23 $\frac{1}{2}$	1 0 1 $\frac{1}{2}$	1 0 9	1 0 13 $\frac{1}{2}$	28 $\frac{1}{2}$	1.78
15	0 3 13 $\frac{1}{2}$	0 3 24 $\frac{1}{2}$	1 0 6	1 0 16	1 0 22 $\frac{1}{2}$	37	2.31
16	0 3 12 $\frac{1}{2}$	0 3 23 $\frac{1}{2}$	1 0 6	1 0 14 $\frac{1}{2}$	1 0 15 $\frac{1}{2}$	31	1.94
17	1 0 1 $\frac{1}{2}$	1 0 9 $\frac{1}{2}$	1 0 16 $\frac{1}{2}$	1 0 22	1 0 23 $\frac{1}{2}$	22	1.37
18	0 3 13 $\frac{1}{2}$	0 3 23	1 0 4	1 0 16	1 0 23	37 $\frac{1}{2}$	2.34
19	0 3 21 $\frac{1}{2}$	1 0 1 $\frac{1}{2}$	1 0 7 $\frac{1}{2}$	1 0 20	1 0 24 $\frac{1}{2}$	31	1.94
20	0 3 24 $\frac{1}{2}$	1 0 8	1 0 17	1 0 23 $\frac{1}{2}$	1 1 6	37 $\frac{1}{2}$	2.34
21	0 3 8 $\frac{1}{2}$	0 3 19	0 3 26	1 0 7	1 0 10 $\frac{1}{2}$	30	1.87
22	0 3 22	1 0 5	1 0 12 $\frac{1}{2}$	1 0 23	1 1 1 $\frac{1}{2}$	35 $\frac{1}{2}$	2.22
23	0 3 20	1 0 1	1 0 8	1 0 12	1 0 14	22	1.37
24	0 3 12 $\frac{1}{2}$	0 3 27	1 0 9	1 0 18 $\frac{1}{2}$	1 0 24 $\frac{1}{2}$	40	2.50
25	0 3 3	0 3 11	0 3 22	1 0 5	1 0 13	38	2.37
26	0 3 11 $\frac{1}{2}$	0 3 18	0 3 23	1 0 2	1 0 6 $\frac{1}{2}$	23	1.44
27	0 3 6 $\frac{1}{2}$	0 3 18 $\frac{1}{2}$	1 0 0 $\frac{1}{2}$	1 0 12 $\frac{1}{2}$	1 0 16 $\frac{1}{2}$	38	2.37
28	0 3 10 $\frac{1}{2}$	0 3 20	1 0 0 $\frac{1}{2}$	1 0 10 $\frac{1}{2}$	1 0 16	33 $\frac{1}{2}$	2.09
29	0 3 10 $\frac{1}{2}$	0 3 22 $\frac{1}{2}$	1 0 3	1 0 12 $\frac{1}{2}$	1 0 21 $\frac{1}{2}$	39	2.44
30	0 3 7	0 3 11 $\frac{1}{2}$	0 3 20	1 0 4 $\frac{1}{2}$	1 0 10	31	1.94
Total increase at each weighing	26 1 5	28 3 6	30 3 17	33 2 4	35 0 27 $\frac{1}{2}$	33.4 Average	2.09 Average
		2 2 1	2 0 11	2 2 15	1 2 23		

TABLE II.—WEIGHTS OF SHEEP IN PEN II. FED ON
CAKE RICH IN OIL.

No. of sheep	Nov. 29	Dec. 31	Jan. 28.	March 5	March 25	Total increase per sheep	Increase per sheep per week
	cwts.qrs.lbs.	cwts.qrs.lbs.	cwts.qrs.lbs.	cwts.qrs.lbs.	cwts.qrs.lbs.	lbs.	lbs.
31	0 3 10	0 3 20	1 0 0	1 0 13 $\frac{1}{2}$	1 0 24	42	2.62
32	0 3 23	1 0 9 $\frac{1}{2}$	1 0 21	1 1 2	1 1 12	45	2.81
33	0 3 2	0 3 10 $\frac{1}{2}$	0 3 22 $\frac{1}{2}$	1 0 7	1 0 16	42	2.62
34	0 3 20 $\frac{1}{2}$	0 3 27 $\frac{1}{2}$	1 0 6	1 0 13 $\frac{1}{2}$	1 0 20	27 $\frac{1}{2}$	1.72
35	0 3 20	0 3 26	1 0 7 $\frac{1}{2}$	1 0 19 $\frac{1}{2}$	1 0 26 $\frac{1}{2}$	34 $\frac{1}{2}$	2.16
36	0 3 22	1 0 6	1 0 17 $\frac{1}{2}$	1 1 1 $\frac{1}{2}$	1 1 9	43	2.69
37	0 3 10	0 3 22	1 0 4 $\frac{1}{2}$	1 0 11	1 0 19 $\frac{1}{2}$	37 $\frac{1}{2}$	2.34
38	0 3 8	0 3 18	1 0 0 $\frac{1}{2}$	1 0 14 $\frac{1}{2}$	1 0 23 $\frac{1}{2}$	43 $\frac{1}{2}$	2.72
39	0 3 12 $\frac{1}{2}$	0 3 22 $\frac{1}{2}$	1 0 3 $\frac{1}{2}$	1 0 16	1 0 22 $\frac{1}{2}$	38	2.37
40	0 3 23	1 0 4	1 0 12	1 0 18	1 0 22	27	1.69
41	0 3 18	1 0 1 $\frac{1}{2}$	1 0 7 $\frac{1}{2}$	1 0 21	1 0 24 $\frac{1}{2}$	34 $\frac{1}{2}$	2.16
42	0 3 10 $\frac{1}{2}$	0 3 17 $\frac{1}{2}$	0 3 24 $\frac{1}{2}$	1 0 5	1 0 11	28 $\frac{1}{2}$	1.78
43	0 3 10 $\frac{1}{2}$	0 3 20	1 0 3	1 0 16	1 0 21	38 $\frac{1}{2}$	2.41
44	0 3 15	0 3 25	1 0 2 $\frac{1}{2}$	1 0 8 $\frac{1}{2}$	1 0 16 $\frac{1}{2}$	29 $\frac{1}{2}$	1.84
45	0 3 3	0 3 14	0 3 23 $\frac{1}{2}$	1 0 3 $\frac{1}{2}$	1 0 11	36	2.25
46	0 3 11	0 3 19	0 3 27 $\frac{1}{2}$	1 0 11	1 0 17 $\frac{1}{2}$	34 $\frac{1}{2}$	2.16
47	1 0 2 $\frac{1}{2}$	1 0 13	1 0 20 $\frac{1}{2}$	1 1 8 $\frac{1}{2}$	1 1 14	39 $\frac{1}{2}$	2.47
48	0 3 12	0 3 24	1 0 8	1 0 21 $\frac{1}{2}$	1 1 2	46	2.87
49	0 3 20 $\frac{1}{2}$	1 0 1	1 0 11 $\frac{1}{2}$	1 0 22 $\frac{1}{2}$	1 1 4	39 $\frac{1}{2}$	2.47
50	0 3 26	1 0 7 $\frac{1}{2}$	1 0 23 $\frac{1}{2}$	1 1 12	1 1 21 $\frac{1}{2}$	51 $\frac{1}{2}$	3.22
51	0 3 7 $\frac{1}{2}$	0 3 18 $\frac{1}{2}$	1 0 3 $\frac{1}{2}$	1 0 12	1 0 19 $\frac{1}{2}$	40	2.50
52	0 3 18 $\frac{1}{2}$	1 0 0 $\frac{1}{2}$	1 0 15 $\frac{1}{2}$	1 0 26	1 1 7 $\frac{1}{2}$	45	2.81
53	0 3 17 $\frac{1}{2}$	1 0 0	1 0 12	1 0 25 $\frac{1}{2}$	1 1 5	43 $\frac{1}{2}$	2.72
54	0 3 10	0 3 17 $\frac{1}{2}$	0 3 23	1 0 8	1 0 17	35	2.19
55	0 3 3	0 3 12 $\frac{1}{2}$	0 3 22 $\frac{1}{2}$	0 3 27	1 0 8	33	2.06
56	0 3 15	0 3 25 $\frac{1}{2}$	1 0 9 $\frac{1}{2}$	1 0 16 $\frac{1}{2}$	1 0 25	38	2.37
57	0 3 8 $\frac{1}{2}$	0 3 21	1 0 1	1 0 17	1 1 0	47 $\frac{1}{2}$	2.97
58	0 3 12 $\frac{1}{2}$	0 3 23	1 0 3 $\frac{1}{2}$	1 0 11 $\frac{1}{2}$	1 0 19 $\frac{1}{2}$	35	2.10
59	0 3 14	0 3 21 $\frac{1}{2}$	1 0 4	1 0 17	1 0 21 $\frac{1}{2}$	35 $\frac{1}{2}$	2.22
60	0 3 8 $\frac{1}{2}$	0 3 21 $\frac{1}{2}$	1 0 0 $\frac{1}{2}$	1 0 10 $\frac{1}{2}$	1 0 18	37 $\frac{1}{2}$	2.34
Total increase at each weighing	26 1 3	28 3 22 2 2 19	31 2 6 2 2 12	34 1 25 2 3 19	36 2 3 2 0 6	38.3 Average	2.39 Average

increased only 1,002 lbs. It will be seen, also, that individual sheep of the former pen eating the more oil gave in almost every instance a much higher increase than the others. For instance, one sheep of this pen increased altogether $51\frac{1}{2}$ lbs., and ten others increased each 40 lbs., or above that weight, whilst none increased less than 27 lbs. *Per contra*, of the sheep consuming the cake low in oil, only two of them increased 40 lbs., or above, whilst there were two sheep in this pen of which the gain was as low as 22 lbs. and 23 lbs. respectively. It seems very clear from these figures that when there was capacity in a sheep to put on flesh rapidly the larger quantity of oil in the cake told very considerably indeed. Table III., on page 413, gives a summary of the results of the food consumed by the sheep in the two pens, per head and per 100 lbs. live-weight; also the increase per head and per 100 lbs. live-weight; and the particulars of food consumed to produce 100 lbs. increase, both in the fresh and dry state. At the same time, and for comparison with the above, is given a summary of experiments upon Southdown sheep carried out by Messrs. Lawes and Gilbert, and published in the Journal of the Royal Agricultural Society nearly forty years ago.¹

Confining at present our attention to the Whitlingham sheep, it will be seen that the average increase per head of those fed upon the low oil-cake was $33\frac{1}{2}$ lbs., whilst the corresponding gain of the sheep fed upon the high oil-cake was $38\frac{1}{4}$ lbs.—a difference of $4\frac{3}{4}$ lbs. in favour of the high oil-cake. The increase per head per week of the sheep in the low oil-cake pen was 2.09 lbs.; of those having the more oily food 2.39 lbs. Or basing the calculation upon the 100 lbs. of average live-weight per sheep, and covering in the reckoning the whole period of test, the sheep fed with the less oily cake gave a weekly increase of 1.82, or a little over $1\frac{3}{4}$ lb., per head, whilst the sheep of the other pen increased per week per head 2.04, or a trifle over 2 lbs.

Of the fresh food consumed by each lot of sheep, that given in limited quantities—viz. the oil-cake and hay—and that given *ad libitum*—viz. the swedes, the consumption was, in both cases, almost exactly alike. The low oil-cake sheep ate—per 100 lbs. live-weight—rather more cake and hay, and nearly $1\frac{1}{2}$ lb. per week more of fresh swedes than the others. Upon examination, however, of the two columns which give the consumption of fodder when calculated as *dry*, it will be seen that the amount of it—when so reckoned—eaten per head and per 100 lbs. live-weight,

¹ See Journal, Vol. XII. 1st Series (1851), pp. 414 *et seq.*

TABLE III.—EXPERIMENTS ON FEEDING OF SOUTHDOWN SHEEP.

Comparison of Results obtained at Rothamsted in 1850-51, with those at Whitlingham Farm, Norfolk, in 1888-89.

	Rothamsted	Whitlingham farm (Mr. Taylor's)		
		Low oil-cake	High oil-cake	
Number of sheep.	40	30	30	
Date of commencement of experiment.	Nov. 7, 1850	Dec. 3, 1888	Dec. 3, 1888	
Date of conclusion of experiment.	May 8, 1851	Mar. 25, 1889	Mar. 25, 1889	
Weeks	26	16	16	
<i>Average Weight and Increase of the Animals.</i>				
	lbs.	lbs.	lbs.	
At commencement of experiment.	88·0	98·0	98·0	
At conclusion of experiment.	140·73	131·5	136·25	
Average	114·37	114·75	117·12	
Increase {	per head during total period	52·73	33·5	38·25
	per head per week	2·03	2·09	2·39
	per 100 lbs. live weight per week	1·77	1·82	2·04
<i>Fresh Food consumed per Head per Week.</i>				
Linseed cake	6·03	4·81	4·81	
Clover-hay chaff	5·78	4·80	4·81	
Swedes	77·79	87·83	88·00	
<i>Fresh Food consumed per 100 lbs. Live Weight per Week.</i>				
Linseed cake	5·27	4·19	4·11	
In clover-hay chaff	5·05	4·18	4·11	
In swedes	68·02	76·54	75·13	
<i>Dry Matter consumed per Head per Week.</i>				
In linseed cake	5·27	4·14	4·20	
In clover-hay chaff	4·69	13·98	13·99	
In swedes	7·84	19·66	19·68	
Total	17·80	17·78	17·87	
<i>Dry Matter consumed per 100 lbs. Live Weight per Week.</i>				
In linseed cake	4·61	3·61	3·59	
In clover-hay chaff	4·10	13·47	13·41	
In swedes	6·85	18·42	18·26	
Total	15·56	15·50	15·26	
<i>Dry Matter consumed to Produce 100 lbs. Gross Increase.</i>				
In linseed cake	260	198	176	
In clover-hay chaff	232	190	167	
In swedes	386	461	405	
Total	878	849	748	

¹ Calculated on average percentages of Dry Matter as given in the 1885 "Valuation" paper.

was almost exactly the same for both lots of sheep. The sheep which received so much less oil, but instead of it an approximately equal weight of the other constituents of the cake, only consumed $\frac{1}{4}$ of a lb. more of dry food per week and per 100 lbs. live-weight than did the others. At the bottom of Table III. is shown the amount of dry food which was used to produce 100 lbs. live-weight of animal, and here it may be seen that the results are largely in favour of the high oil pen of sheep. This lot consumed altogether, of cake 176 lbs. per 100 lbs. gain in live-weight as against 198 lbs. eaten by the others, a difference of 22 lbs.; of hay 167 lbs., as against 190 lbs., a difference of 23 lbs.; and of swedes 405 lbs., instead of 461 lbs., or a difference of 56 lbs. of dry swedes. The total difference of consumption, taking all the foods together, between the two lots was 101 lbs. Or, putting it in another way, it took, when the cake was poor in oil, 849 lbs. of dry food to produce the same increase in the sheep as 748 lbs. of it produced when the cake was rich in oil.

Now although the advantage, as proved by the scales, in favour of the sheep which had the more oily cake was very considerable, it was scarcely so great, according to the judgment of certain practical valuers to be given directly, as that which was actually obtained. And if the improvement in the better pen of sheep was really greater than that registered by the machine, the additional superiority must have been due to some quality of carcase which could not so be brought out. Many years ago Messrs. Lawes and Gilbert published a table on the composition of sheep, both in a store and in fat condition. In it was shown that the carcase of a sheep of the leaner kind contained 24 per cent. of fat, and 57 per cent. of water. On the other hand, the carcase of a fat sheep gave 45 per cent. of fat, and the very different proportion of only 40 per cent. of water. There is here, it is true, no absolute proof that fat displaces water without necessarily increasing the weight of a sheep; nevertheless, the evidence as it stands has a very pertinent bearing upon the opinions of the experts to be presently supplied.

Taking still the increase in weight only as the basis of improvement, the 30 sheep eating most oil increased 146 lbs. over the others; and if it be assumed that two-thirds of this extra gain was in carcase, we have 97 lbs. more of meat at 9d. per lb. = 72s. 9d., or 2s. 5d. per head. The following may be taken to represent roughly the quantities of the several ingredients of the respective cakes consumed per sheep during the experiments, as computed from the analyses of Dr. Voelcker.

	Quantity of each ingredient in the high oil- cake consumed per sheep during the experiment	Quantity of each ingredient in the low oil- cake consumed per sheep during the experiment	High oil-cake, excess of nutrients over low oil-cake	Low oil-cake, excess of nutrients over high oil-cake
Moisture	9.77	10.71	—	.94
Oil	12.48	5.18	7.30	—
Albuminoids	22.18	26.18	—	3.90
Mucilage, sugar, &c.	22.68	24.78	—	2.10
Woody fibre	5.88	5.90	—	.02
Mineral matter . . .	4.01	4.35	—	.34
Totals	77.00	77.00	7.30	7.30

Thus while the high oil pen of sheep took 7 lbs. 4 oz. more oil in their food, the low oil pen had 6 lbs. more than the others of digestible food, consisting chiefly of albuminoids and mucilage, &c. in its stead, the residue being water and mineral matter. The 7 lbs. 4 oz. excess of total oil, taken during the sixteen weeks of the experiment by the entire pen of sheep having the more oily cake, is, as nearly as possible, equivalent to an excess per sheep, per day, of one ounce only of oil over the quantity of oil taken by the sheep of the other pen. When, therefore, it is also remembered that this slight deficiency of oil, to those sheep receiving least of it, was made up to them by an excess of nearly one ounce per head, per day, of other highly nutritious food, the delicacy and nicety of the experiment will be at once appreciated, as well as the care and precaution necessary to carry it out successfully upon living animals subject to so many variations and accidents.

In further reference to the column in Table III. headed Rothamsted, it should be explained that some feeding experiments were carried out by Sir J. B. Lawes nearly forty years since upon different breeds of sheep selected with great care from the famous breeders of the day. Amongst them were specimens of the same breed—the Sussex or Southdown—as those which were employed at Whitlingham, and it is of them that particulars are given in the Rothamsted column for the purpose of advantageous comparison. The sheep fed in 1850 were 10 lbs. lighter than those fed in 1888–9, and they had also had a higher allowance of cake than the Norfolk ones.

The figures in the table for all three pens of sheep show that the dry food consumed per week, per head, and per equal live weight of animal, was in every case almost identical. Thus the sheep fed in 1850–1 ate 15.56, or a trifle over 15½, lbs. of dry food, the low oil-cake sheep exactly 15½ lbs., and the high oil

ones 15½ lbs. When it is remembered the extreme and well-known care with which all the experiments of Lawes and Gilbert have been conducted, I venture to think this singular identity of result will be accepted as evidence of a corresponding care and exactness in the management of the Norfolk experiments.

It has been already shown that the dry food required to produce 100 lbs. increased live-weight was much larger when the cake less rich in oil was employed in the Norfolk experiments than it was when the more oily one was used. It appears, however, that in the case of the sheep fed in 1850-1, 29 lbs. more food were required to give the same increase as the less productive of the Norfolk pens. Possibly the chief explanation of this fact is to be found in the great improvements of the last half century, which have been so universally effected in almost every breed of sheep, a steady progress involving the capacity, economically and generally, to make the best of feeding opportunities. In the paper on the composition of oxen, sheep, and pigs (Vol. XXI. 1st Series of this Journal), Messrs. Lawes and Gilbert give calculations of probable quantities of dry food which were required to give one pound of animal increase. But I am informed that the results of more recent experiments than theirs make these gentlemen disposed to think that less food is at the present time required to obtain a given animal increase than was the case when their estimate was published. In addition to this it may be observed that the progress of the Norfolk experimental sheep, as gauged from time to time by the scales, was less rapid during the later than in the earlier weeks of the experiment, when the sheep were less advanced in condition. And as the total duration of the Rothamsted experiments exceeded by several weeks the Norfolk ones, it appears likely that this circumstance may in some measure account for the slightly less economical results. It is true that the Rothamsted experiments were carried on under cover from the weather in a thatched building, the back and sides of which were enclosed, and the sheep stood upon rafters, whilst the Norfolk experiments were conducted in the open. Theoretically speaking, no doubt the less animals are exposed to the cold the less of their carbonaceous food-fuel is needed to sustain the necessary temperature of the body, and thus more of it should be available for conversion into bodily repair or increase, in which case the same amount of dry food per given live-weight of animal should produce greater gain of flesh or fat in the protected than in the exposed sheep. Animals, however, are largely creatures of nerves, of habit, and hereditary acquirement, and not mere

machines, and cannot, therefore, be predicted for with mechanical certainty. By ages of inurement sheep have become very hardy animals, till they enjoy almost any amount of cold, if only they can have dry backs. They revel also in ample space for movement, as the nearest imitation of their free hill life. Less natural conditions, therefore, may have so affected the health and condition of the Rothamsted sheep as to more than counterbalance their apparent theoretical advantages.

Leaving now the more strictly scientific aspect of the experiments, it may be well to consider them very briefly from—popularly speaking—a more practical point of view. For in the way of direct and easily accessible lesson to the farmer they should surely be very valuable and instructive.

At the conclusion of the experiments, and in order to check or confirm the record of the weigh-bridge, it was thought desirable to take the opinions of competent outsiders, so far as observation and experience could guide them, upon the difference in appearance and in touch between the two lots of sheep. This course was the more desirable from the well-known fact that practical farmers habitually place more reliance upon the judgment of those accustomed to handle stock, and estimate them by the eye, than upon any decision of the scales. Moreover, even the strongest advocates of the weighing test acknowledge freely that its chief value is to assist the hand and eye. Two, therefore, of the best and best known farmers in Norfolk, having exceptional knowledge of all kinds of stock, both store and fat, together with a large farmer and dealer who has had much experience also in the business of butcher, were invited to inspect all the experimental sheep. Before the arrival of the trio of referees there had been selected from each pen of thirty sheep six of the most equal and average weight, which were separately penned at a distance from the rest. After these twelve sheep had been duly and minutely examined the remaining twenty-four of each lot were penned closer in their own folds and separately inspected.

The practical experts, who of course were not afforded the slightest clue to the identity of the sheep, nor informed of the treatment of any of them, were then invited to decide upon the difference, if any, between the two pens of six, and the two of twenty-four sheep, and to report in detail upon any variations. They were entirely unanimous in all the opinions expressed in their report, the details of which are as follows:—The sheep fed with the more oily food were declared to have made more growth, as well as more flesh, than the others. They had “dropped” more in carcase, the other lot being “straighter”

when unpenned and looked at off-hand. Their wool opened more as they walked, a good sign of health, condition, and well-doing, and they had generally a more glossy, thriving, and taking appearance. All these points of merit were considered to indicate the fuller "ripeness" of the high oil sheep. At the same time, so far as mere fatness was concerned, and judging by the usual proof of it, in firmness, &c., under touch, no one was prepared to give a very decided opinion in favour of either pen of sheep under this head alone.

The fact was that both pens—or almost all the sheep of both pens—were so thoroughly fat as to have reached a stage when little if any difference could be outwardly detected between them. The inspection really was, by a few weeks, too late for this particular purpose.

As put into precise figures of market worth, either by open sale or for slaughter, the difference in value to dealer or butcher of the sheep as they stood was declared by the judges to be from 2*s.* to 3*s.* per head in favour of the high oil pen of sheep.

Each lot of thirty sheep consumed rather over one ton of cake. The difference in market value between the two cakes, as nearly and fairly as it can be estimated, was 20*s.* to 30*s.* per ton. The increased value per sheep of the high oil pen, according to the scales, was, as has been shown already, 2*s.* 5*d.* per head, or a gross gain of 3*l.* 12*s.*, over the low oil pen, in return for an extra expenditure—had it been bought at market rates—of 20*s.* to 30*s.* on the dearer material. In addition, however, to this profit of 100 or more per cent. on excess of outlay upon a richer cake, there is the further problematical gain, beyond that recorded by the weigh-bridge, arising from the displacement of water by fat in the riper sheep, for which there is, as has been shown, considerable evidence, if no actual proof. By estimate of the experts also, the superior market value of the best pen of sheep was, at the higher figure named by them, 3*s.* per head, or 4*l.* 10*s.* per pen, which is slightly in excess of the record of the scales. However, in any case an extra increase of 2*s.* 5*d.* per sheep was clearly obtained by use of the high oil-cake, for an extra expenditure upon it of 8*d.* to 1*s.* per sheep.

It therefore follows that a linseed-cake, containing 15 per cent. of oil, and costing on that account some 20*s.* to 30*s.* more money per ton, may not only be used with great advantage to grazing sheep, but with considerable profit to the farmer. Or, to put it in another way, it is now very decisively proved that, weight for weight, linseed-oil, to the extent of 15 per cent., in a cake, has a much higher feeding value than have

the other constituents of a linseed-cake which in the absence of the oil would replace it. So that all the recently expressed opinions, English and Continental, on the equal or even superior value of certain cakes low in oil, as compared with some more oily ones, are altogether false. In grasping this lesson, however, it will be well to bear in mind that all oil is not linseed-oil—the kind which was used with such remarkable advantage in these experiments. For it is to be feared that now the value of linseed-oil is so conclusively and publicly demonstrated, oil of another and very inferior kind may find its way into the farmers' cakes, with very inferior results upon the farmers' stock.

It would be ungrateful indeed to close this report without a warm acknowledgment to Sir J. B. Lawes of the very great assistance he so readily afforded—at no small expenditure of time and trouble to himself—throughout the course of the experiments. Without this inestimable advantage it is not likely that our efforts would have resulted so successfully, and therefore, as it is hoped, so usefully. Nor do the personal obligations of the writer to Sir John Lawes end even there, for they really extend to and embrace a great deal of further invaluable aid in the preparation of this report.

XXII.—*The Practice of Cheddar Cheese Making.* By GEORGE GIBBONS, Tunley Farm, Bath.

AN honest attempt to describe the manufacture of that most nutritious of foods, Cheddar cheese, for which the county of Somersetshire has long been famous, being the purpose of this paper, it will not be necessary to dwell on the vast importance of the Dairy interest, the various breeds of cattle best suited for it, their food and management, the composition of milk, the chief sources of its supply, or many other interesting questions that may strike the casual observer.

Here let it be understood that it is impossible to lay down a general rule for the making of fine cheese which will apply to all soils and to all seasons of the year. Doubtless it is most easily made, and of the best quality, on those sweet pastures (often of only medium value) on which no coarse grasses are found, where the cows feed evenly, and no rough tufts are seen. It may be stated that the finest cheese of the year is made during the months of August and September.

The experience of good makers shows that milk produced from gravel or clay soils needs a considerably higher temperature in its manufacture into cheese, than if produced on mountain lime-

stone or sandstone formations. Also that a higher temperature is required where cows drink soft than where they drink hard water.

The first essential is pure sweet milk of good quality; and to be pure and sweet not only must the dairy and its surroundings be scrupulously clean, and no part of it used, as is too often the case, as a larder or store for vegetables, paraffin, &c., but the cow-houses must be well cleaned and ventilated. Above all, the udders and teats of the cows, and the hands of the milkers, must be thoroughly washed before milking, and the greatest care taken to prevent any impurities getting into the milk. This cannot be insisted upon too strongly, as there is not the slightest doubt but that large quantities of milk are thus irretrievably ruined for the making of fine cheese before coming into the dairy, and it is only by the most strict and constant supervision that this can be prevented.

It is not necessary that the dairy, and other offices connected with, and indispensable to it, should be expensive erections. I will give my idea of a complete practical dairy for cheese-making; but the possession of it is no guarantee that fine cheese will be made—or its absence, that such will not be made.

The best and most convenient position for a farm-house dairy is on the north side of the house, and parallel to it, but connected by a covered passage six feet wide: thus the coolest site is secured, and ease of access, with complete ventilation, obtained. The dairy room should be the one nearest the dwelling, and, if from fifty to sixty cows are kept, be at least 8 yards by 5, and 10 feet high. The walls should be well built of brick or stone, with glazed windows on the north, south, and east, 4 feet by 3 feet each, having sliding casements, and protected on the outside by finely perforated zinc. The floor should be of concrete, well-laid pavement, with cemented joints, or York stone.

The boiler-house, in which all utensils are cleaned, should adjoin the dairy on the west, and it should be 7 yards by 5 in size; the floor should be equally as good as that in the dairy, and the windows of like dimensions and character. Provision is easily made for the escape of steam by ventilators placed under the wall-plate. There should be an open boiler (with a water-tap), placed as low as possible on the left hand of the door from the dairy, and capable of containing from thirty to forty gallons; and if its cover be placed on hinges, it can, by a balanced weight connected by a cord passing over two small pulleys, be most easily raised or lowered. On the north side of the boiler-house is the best position for the whey-room, say 5 yards by $2\frac{1}{2}$, well ventilated by windows east and west, and at a

lower level of two feet than the dairy, so that the whey can pass by open shoots from the cheese-tub into a cistern placed upon stands, large enough to contain the day's supply at a depth of twelve inches. (Useful butter can be made from cream taken off the whey, either for immediate consumption or potting down for winter use.) This cistern should lead, by socketed 2-inch glazed pipes, into the whey-vault (to hold at least 100 hogsheads), and the connection between the cistern and glazed pipe have a bend ten inches deep, so as to prevent any gas coming into the buildings from the vault when the cistern is being emptied. A plug placed at the bottom of this bend is useful in case of stoppage. Glazed pipes are recommended, because the whey soon perforates metal. No drain should on any account be allowed in the dairy buildings, but all washings let off by an open shallow gutter and glazed pipes through the walls into a well-trapped drain outside. If this is not done, bad smells and gases will be certain to ruin the milk. An ample supply of pure water, with taps where needed, is of course a necessity.

Over the dairy and boiler-house should be the cheese-rooms, approached by an easy staircase from the latter—9 feet high to the wall-plate, and ceiled, the roof joists being boarded and covered with felt. Tiles are preferable to slates, the object aimed at being to provide an even temperature through the year (the whitewashing of the tiles in the summer months much assists in this). The floor joists should be 11 inches by 3 inches, and the boards tongued. Hot-water pipes laid close to the walls give the best method of heating—all sides of the cheese thus getting an even temperature, a result which is not secured by stoves. The shelves should be of $1\frac{1}{2}$ -inch red deals, 18 inches wide, so arranged as to afford the easiest method of turning the cheese. The windows should have blinds for cooling the room in summer, and should admit of easy ventilation.

In the inner room for young cheese, there should be a temperature of 65° to 70° , and in the outer room for the older cheese 60° to 65° . Half the space over the boiler-house may be partitioned off, as the other half and that over the dairy is ample for the two cheese-rooms, leaving the third as a most useful dry store for spare utensils, salt, &c.

The most approved Cheddar cheese tub—or vat, as some call it—is round, and made of the best and strongest block tin; copper is sometimes used, but is more expensive, and when the tin wears off (as it soon does) is very undesirable. Not only is the curd more easily and evenly broken in the round than in an oblong vat, and kept from sticking to the bottom, but the swing that can be given to the mass at the close of scalding

by the collection of the curd in the centre of the tub, saves a not inappreciable amount of labour. Some of the best tubs I have seen are made by Pond & Son, of Blandford.

Various systems have from time to time been introduced for heating the contents of the cheese-tub, by steam or water through double sides and bottoms. These are not now generally used, mainly on account of the difficulty that arises in preventing the curd that comes in contact with the sides and bottom from being over-cooked.

It is considered—and rightly so—a most heterodox practice to allow butter to be touched by the hand; and why is not this equally so in the manufacture of cheese? Yet in many dairies, the owners of which pride themselves on adopting the most approved methods, not only the hand, but the whole arm is immersed in nearly every operation. Such need not, and should not, be the practice.

The use of vells is well-nigh discarded by the best cheese-makers in favour of the various known and tried essences or extracts of rennet, such as Hansen's, Blumenthal's, Anglo-American, Michell's, Quick's, and Van Hassalt's. These are of uniform quality, are moderate in price, and have proved a substantial boon to the dairy industry, as the ever-recurring difficulty arising from the varying strength of rennets made under the old system is avoided. Full directions are given as to the quantity required to be used, and any variations rendered necessary by the different soils will soon be ascertained by the careful maker. Great accuracy is required on this point, as the use of too large a quantity is very detrimental, causing the produce to be hard and dry; and the use of too little would be equally disastrous, as the coagulation would be imperfect, thus allowing many of the fatty particles to pass off with the whey.

As soon as drawn, the milk is taken to a receiver, about eighteen inches square, placed in the most convenient position outside the dairy, so that by a short open shoot it can pass through the wall into the cheese-tub, being thoroughly strained in the passage, thus doing away with the necessity of the milkers entering the dairy. The evening's milk can generally remain in the cheese-tub during the night. When the temperature is high, an occasional stirring is useful; but in damp, hot, moist weather, or during electrical disturbances, some of it should be placed in other vessels.

In the morning the first duty of the careful cheese-maker is to examine the condition of the night's milk, and, if acidity be perceptible, the morning's milk only should be heated; as a rule, this is advisable from about the middle of June to the

end of August. The night's milk is skimmed, and the cream put in with the milk to be heated in a tin vessel called a warmer, surrounded by hot water in the open boiler, referred to as being in the boiler-house, and in which the whey is also heated. Particular care must be taken not to exceed a temperature of 95° . By this the united milk should be raised to 84° ; but by the end of June it can be reduced to 82° . A little sour whey may be added in the earlier and latter months, but its regular use cannot be recommended.

When annatto is used, it must be well stirred in, and sufficient rennet added to coagulate the milk in sixty minutes. The thorough mixing of the milk and rennet is very important, and should occupy about ten minutes, not only for its thorough incorporation, but also to prevent the cream rising to the surface. The tub should then be covered over till coagulation is complete, in order to guard against a too rapid fall in the temperature of the milk. By the time the curd will break clean over a tubular thermometer, the delicate operation of breaking should begin. This is facilitated by the use of a thin knife, long enough to reach the bottom of the tub, for cutting the curd into squares of about two inches.

It should then be left a few minutes to harden and for the whey to separate, when, by the use of a shovel-breaker, the splitting of the curd in its own grain commences. This at first must be done with the greatest caution, or the whey will get white and loss of quality ensue; but the speed should increase as the curd hardens—always taking care that it is regularly broken, and not smashed, until it is the size of a pea, and the whey of a greenish hue; the time of this operation depends somewhat upon the quantity dealt with, but it should take from fifty to sixty minutes. The mass is now allowed to settle for ten minutes, when with a syphon sufficient whey is drawn off, which, when heated to not more than 130° , would raise the whole to 90° . During the application of this whey the curd must be well stirred and mixed. A further rest of ten minutes takes place, when enough whey is drawn off for heating to 130° , and that in the tub lowered till it only covers the curd by about two inches. The heated whey is poured in a small stream over the curd, the operator taking the utmost care that the whole mass is thoroughly broken up and incorporated with it, the thermometer being frequently used, until it stands at 100° , the limit desired; but the stirring must be continued until the curd becomes shotty and is disposed to sink, the whey showing above it clear and green.

This operation takes from ten to thirty minutes, but if the

curd does not harden sufficiently fast, and the temperature falls quickly, it would be well to add more hot whey, so as to retain the heat at 100°. The curd now rests thirty minutes (or, if it is sufficiently acid, a shorter period will do), when all the whey is let off, and the curd piled as high as possible in the centre of the tub. Carefully wash down all crumbs, strain, and place them on the top of the mound. Cover and keep it warm with cloths until it has become sufficiently solid to cut into large pieces which can be turned over without breaking.

When this has been done, the whole should be again piled and kept covered for thirty minutes longer, as before. After this, it is removed to the curd-cooler, cut into smaller pieces, and again piled and covered for thirty minutes, which cutting, changing, piling, and covering is continued until the curd presents a rich, dry, mellow, solid appearance, and a perceptible amount of acidity has been developed, which is easily ascertained by taste and smell. It is now ground, and should be a ragged solid curd, dry, but greasy, and if several pieces are pressed together by the hand the fragments would easily fall apart.

Use fine clean dry salt at the rate of $2\frac{1}{4}$ lbs. per 112 lbs. of curd, great pains being taken to thoroughly mix it. At this point the temperature of the curd should not be below 70°, and it should be put into the vat or mould, lined with a thin cloth large enough to cover the cheese, placed in the press, where it has a pressure of about 20 cwt., and allowed to remain until the next morning, when the cloth is changed, the position of the cheese inverted, and replaced in the press until the following morning. A little fat rubbed over it softens the surface, and is useful in preventing cracks. A square piece of muslin should be placed on its top and bottom, and the sides also completely covered with the same material, of sufficient width to draw over the squares $1\frac{1}{2}$ inch, to which it should be neatly sewn. Replace the cheese in the press, where it must remain two days longer. It should then be stoutly bandaged and removed to the warm cheese-room, whence, after being turned daily for six weeks, it is taken to the cooler room, and turned every other day until three months old, after which, turning once every four or five days is sufficient. Much trouble and damage to the cheese is saved by the use of vats which open with a key, as made by Brown, of Shepton Mallet, Somerset.

That the manufacture of fine cheese in home dairies can and may be carried out by these methods is evidenced by the fact that the gold medal at one of the Paris Exhibitions was awarded for cheeses thus made, also the highest prizes at the Amsterdam International Show. And at the great Dairy Show of 1878 at

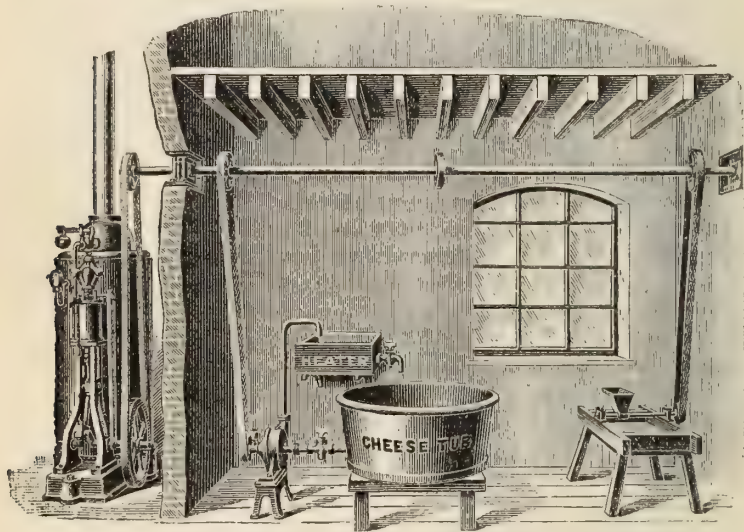
New York, where English cheese, made thus, competed with the choicest productions of America and Canada, two first prizes were awarded them, besides many at the Royal Agricultural Society's and other English Shows.

Some successful makers scald at a lower temperature, only raising the first scald to 86° or 88° by whey heated to 120°, stirring the curd to assist the hardening fifteen or twenty minutes. The temperature of the second scald is 98°, by whey heated to 130°; it should be stirred until the curd is shotty, and then left for twenty minutes, or less, if acidity develops fast. In this case no whey is removed from the curd previous to scalding, except what is required for heating. After the expiration of the time of rest, all the whey runs off; then the usual course is to place the curd on a rack to drain in the centre of the tub, cutting, turning, covering, and keeping warm, placing a board and heavy weights on it to facilitate separation of the whey, promote acidity, and produce a solid curd.

The foregoing descriptions of the manufacture of Cheddar Cheese may be generally followed in small or medium-sized dairy farms; but where large quantities of milk are dealt with, a saving of the heavy laborious work entailed in the lifting and carrying the whey to be heated to and from the boiler is most desirable. As already stated, the heating of the milk and whey in the cheese-tub by steam or water is not generally favoured; but an improved system, which combines the minimum of labour with the highest results of manufacture, is effected by the use of appliances illustrated on p. 426, and made by E. S. Hindley, of Bourton, Dorset. By this system the quantity of milk or whey required for heating is raised by means of a small centrifugal pump to a tin or copper-tinned vessel called the heater, placed on a level with the top of the tub and partly overhanging it. This has a double bottom, into which steam is introduced. A suitable size for a sixty-cow dairy would be 4½ feet by 2½ feet, and 1 foot deep, thus easily containing 60 gallons. The milk in it can be quickly heated to 95°, which it should never exceed. Then by the opening of a tap it passes into the tub for raising its contents to the required temperature for renneting, say 84° for the early months, and 82° or 83° later on. The operation of breaking proceeds as before described, but the whey is raised by the same pump into the heater for scalding, and discharged over the curd in the cheese-tub. The lifting and heating of the whey and milk are effected rapidly and without any manual labour, as the pump is worked from a shaft driven by a small steam-engine, the boiler of which supplies the steam to the heater. It also heats all hot water needed, and supplies a jet of steam, which is very

useful in the thorough cleansing of utensils. The pump can be cleaned without difficulty, by passing steam and water through it. The shaft also affords a ready means of driving the curd-mill, placed over the curd-cooler; and in those dairies where butter is made, the power is available for driving the separator, churn, and butter-worker. The writer can, from experience of this appliance in his own dairy, testify to the immense saving of time and trouble, and the certainty with which good results can be obtained by this efficient and comparatively inexpensive system.

In a well-managed dairy, where the cheese is properly cured as described, the thin cloths and bandages can be kept on the cheese for transit, as there is thus much less chance of



damage; and when the cloth is removed by the retailer or consumer, the cheese should open free from mould, mites, or cracks; and should possess fine mellow texture, sweet aromatic flavour, and pure rich buttery quality, retaining these characteristics if kept for years.

XXIII. *The Practice of Cheshire Cheese Making.* By JOSEPH RIGBY, Stanthorne, Middlewich.

THERE are three different modes of cheese-making followed in Cheshire, known as (1) the *early* ripening, (2) the *medium* ripening, and (3) the *late* ripening processes. There is also a method of making which produces a cheese that is permeated with "green mould" when ripe, called "Stilton Cheshire": this, however, is confined to limited districts in the county.

The early ripening method is generally followed in the spring of the year until the middle or end of April; the medium process from that time until late autumn; or until early in June, when the late ripening process is adopted and followed until the end of September, changing again to the medium process as the season advances. The late ripening process is not found to be suitable to follow in the spring or late autumn.

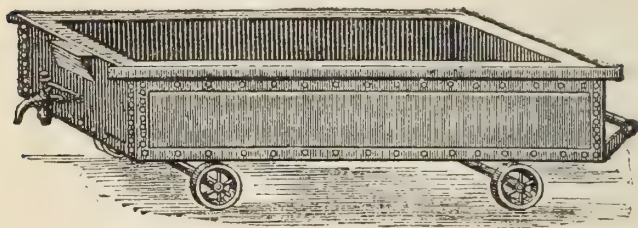
The *premises* required for making and ripening cheese are a dairy, a press-house, and a curing or ripening room. The dairy should be constructed with a view to preserve an equable temperature, and to give ample ventilation from floor to ceiling. It should have a northerly aspect, and the windows should be as far as possible from any place from which foul smells may proceed. The floor should be of hard tiles, set in cement, and the drainage planned so as to avoid smells and back draughts. On no account should the floor be lower than the land on which it is built, for dampness and wet walls are thus produced, which are most undesirable. The press-house should be of similar construction to the dairy, and should contain a "cheese-oven"—a chamber built in one of the walls in which the newly made cheese is put the first day. It should be arranged so that it can be heated by a flue passing under the bottom to keep it at a temperature of 70° to 73° F. A room on the first floor with a southern aspect is best adapted for a curing-room. It should be free from draughts, and the windows should be fitted with shutters, to darken it. The temperature of the dairy should be about 60°, of the press house 65° to 70°, and of the curing room 55° to 65° F.

The *utensils* requisite are a milk vat, curd knives, curd mill, cheese moulds, cheese hoops, cheese stools, curd shovels, cheese presses, milk pails, pans, &c. The milk vat is an oblong vessel, about 20 inches deep and 30 inches wide, mounted on four wheels, and suited in size to the number of cows kept. It is double-cased, the inner case being of best steel; the space between, about 2 inches, being adapted to fill with cold water for cooling the milk, or with hot water or steam for heating it. It is fitted with

brass taps, draining cylinder, syphons, covers, and draining racks in three pieces, on which the curd is placed during making. The greater facility and economy of labour with which curd can be worked in such a vessel, as compared with the old-fashioned circular cheese-tub which was once universal, is very obvious.

The curd knives are either horizontal or vertical, and made of the finest steel, with sharp edges, the blades being half an inch apart; the breaker, which combines the action of the two knives in one, is sometimes used in their place. The curd mill, fitted with spiked rollers, is made of either iron or wood, and capable of reducing the curd to the size of large peas. The cheese hoops, of either wood or steel, are from 12 to 16 inches in diameter; they are fitted with tin and wooden followers. The cheese presses are of either the single, double, or triple chamber type, on the double lever system, and capable of applying a pressure of from 4 cwts. to 1 ton.

Fig. 1.—*Milk Vat.*

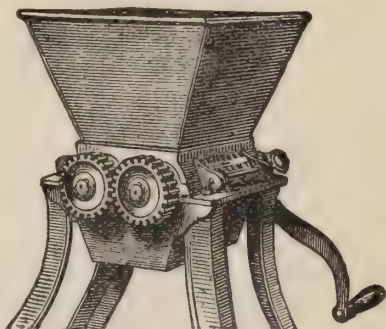
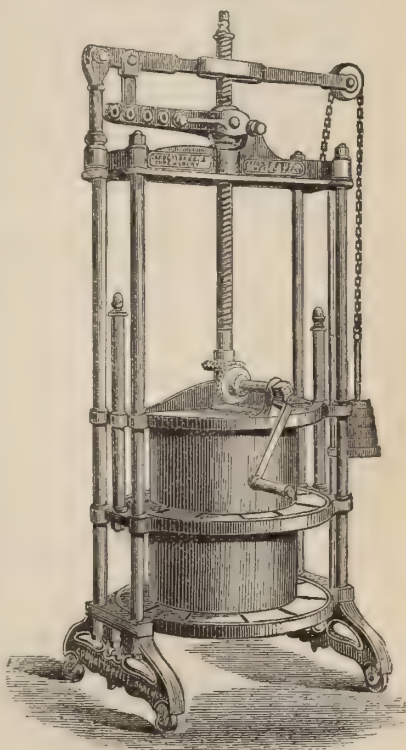


The agents employed in making cheese from milk are rennet, salt, annatto (when the cheese is coloured), heat, and pressure; and it is in the proper combination and application of these that the perfection of making consists. In addition there are *atmospheric influences* to be considered. These begin to act on the milk as soon as it is drawn from the cow, and continue their action until the cheese is brought to the consumer's table. They effect the ripening of milk, and it is on the degree of ripeness present in the milk before the rennet is added that success in making cheese largely depends. This ripeness is produced by the action of a certain ferment received into the milk from the atmosphere, known as the lactic ferment, which causes a chemical change and transforms the sugar of milk into lactic acid. Its activity is greatly influenced by temperature; it is most active about 98° F.; above and below that point its activity is slower. Milk ripens more quickly in a moist atmosphere than in a dry one. Other ferments act on the constituents of

milk, and become injurious to successful work if they get too free play in the process of making. Bad odours of every kind are freely absorbed by milk, and indelibly impressed on the produce made from it. Nothing is more important than a perfectly clean, dry, and well ventilated dairy. It is found in practice that the best temperature for the night's milk to stand at when the morning's milk is added, is from 63° to 70° F. The requisite degree of acidity is then produced in the curd, and the best flavoured and most valuable cheese results. If the milk is below 63° F. it will not be ripe enough to do this by the usual course of making; and if it is even a little over 70° F. it will be over-ripe, and too much acidity will be produced.

The uses of acidity are to help, in conjunction with the rennet, to expel the whey from the curd, and to form the texture of the cheese; the right quantity will give a rich-coloured, fibrous, velvety curd, which will develop into a meaty, rich, fine-flavoured cheese. Too much acidity would give a highly coloured, crumbly, dry curd, that will ripen into a dry hard cheese; while too little, again, will give a weak-coloured, soft, spongy curd, which will ripen into a weak and often tainted cheese.

Rennet is so well known to cheese-makers as to require no description,⁵ and if it is

Fig. 2.—*Curd Mill.*Fig. 3.—*Cheese Press.*

pure and good it may be used in a liquid state or as a powder, or direct from the skin. It is of great importance to have it of uniform strength, to know what that strength is, and to use the right quantity. The most practical and reliable way of ascertaining the strength is to take a drachm of the liquid, or a fixed portion of the powder, and mix it with five gallons of milk at the temperature it is usual to set the whole of the milk together, and to notice how long it is before it begins to thicken. If this occurs in from 20 to 25 minutes the right proportions will have been found. If it takes a longer time more rennet is required. If a shorter time a less quantity should be used. The exact quantity can only be fixed upon by repeated careful tests in individual dairies. Too much rennet causes the curd to become dry and brittle, too little leaves it soft and spongy. The use of the cured and dried skins in pieces cut off daily is not recommended, nor is the use of highly concentrated or very strong rennet in powder; the former is irregular in strength, and the latter requires great nicety in measuring. The liquid state allows of most accuracy in use. The action of rennet on milk is to coagulate the caseine, in which act it encloses the butter-fats, and then causes a separation of these solids from the liquid whey. Rennet also acts in harmony with acidity in reducing or softening the fibre of the curd, in assimilating moisture, and in forming the consistency of the ripe product.

Salt gives flavour to the curd, and checks the further development of acidity after it is mixed with it, helps drainage, regulates the ripening influence of rennet, and in some degree arrests decay. About $6\frac{1}{2}$ oz. to 20 lbs. of curd are used in the early spring, 8 oz. to 20 lbs. in the summer, increasing to as much as 9 oz. as the milk becomes richer in the autumn. An over-acid curd requires less salt than the quantities named, while an under-acid moist curd does not receive much benefit from a larger addition of it.

Pressure binds together and consolidates the curd and helps to expel the moisture; it should be applied gradually, for, if too great a weight is applied, the first day some fatty matter goes off in the whey. A curd having a tendency to over-acidity should only be lightly pressed, to retain as much moisture as possible, while no amount of pressure will get the whey out of a moist under-acid curd, and when it leaves the press it "heaves," owing, no doubt, to the uncontrolled action of ferments which form gases in the body of the cheese.

It is not possible to lay down any exact rule or rigid order of procedure in making which will answer under all the varied

conditions of weather, dairy accommodation, and material surroundings; every maker must use his own individual perceptions, and adapt and vary with judgment his course of making. The following rules are, however, followed generally in the making of Cheshire cheese.

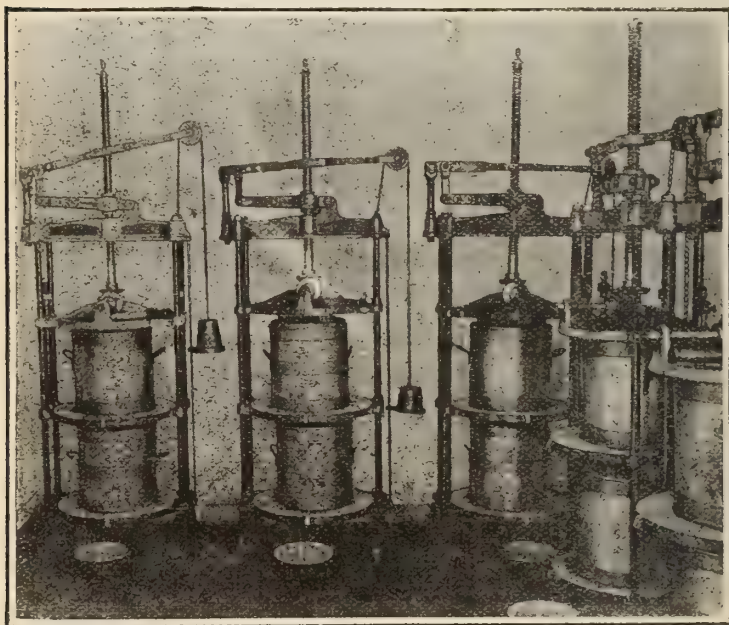
The Early Ripening Process.—The night's milk is sieved into the vat in the dairy and left until morning; the cream is then skimmed off and the morning's milk sieved into the vat, with the cream slightly warmed; the heat of the whole is then raised to 78° or 80° F., and sour whey is added in the proportion of 1 quart to 30 gallons of milk, to promote the formation of the necessary acidity in the curd. Rennet is then added, and the curd should be ready to cut in an hour; the quantity used is larger by 50 per cent. on this process of making than on the other systems; when it is ready, the curd will break clean over the finger without adhering when dipped into it and raised sideways. The knives or cutters are then used and the curd is carefully cut, the operation ceasing when the pieces are the size of beans; it is then allowed to settle, and the whey remains on until there is a decided development of acidity. The curd is then gathered to one end of the vat and the whey drawn, then it remains for a short time on the bottom of the vat to drain; it is then salted, in the proportion of one quart of salt to 50 lbs. of curd, and filled into moulds (into which a cheese-cloth has been laid), in moderate-sized pieces, without grinding. After standing twenty-four hours the cheese is turned into another hoop; a clean dry cloth is used. It is turned again the following morning, and put under light pressure, and pressed for two or three days, being turned each morning, and a clean dry cloth used. The cheese is then taken from under press if the drainage has ceased or not, and a thin calico binder is pasted round it, and it is removed to the ripening room. For the first week it is turned every day, then every other day, and at the end of three or four weeks it should be ready for sale.

The Medium Ripening Process.—The practice usually adopted is to sieve the night's milk into the vat and to cool it down (if necessary), so that it will be at a temperature of 66° to 70° F. in the morning; this is regulated by the season of the year, the temperature of the dairy, and the quantity of the milk. Next morning the cream is skimmed off, the morning's milk is added, and the cream, slightly warmed, passed through the sieve with it, and the temperature of the whole is raised to 86° or 88° F. by turning the steam under the vat. If coloured cheese is being made, the annatto is run in at this stage and well mixed with the milk; the rennet is next added and another stirring given, and

in an hour it should be ready to cut, being at that time elastic enough to break clean over the finger without adhering when placed in it and raised sideways. The top of the curd, which may have a thin film of cream on it, is then turned over with a skimmer, and the breaking down proceeds with the curd knives or breaker until the pieces are the size of an Indian corn.

This takes from thirty-five to forty minutes, and should be carefully carried out. Good work is known by the whey coming off green and clear, while indifferent work is known by thick-look-

Fig. 4.—*Press Room.*



ing creamy whey. The temperature is then raised to 92° or 91° F., the mass being kept well stirred until it is thoroughly and uniformly heated; then the curd is allowed to settle to the bottom of the vat, and the whey is left on, until there is a slight development of acidity, tested by the sense of smell or by the acid reaction on blue litmus paper. The curd is then gathered to one end of the vat and the whey drawn; two pieces of the draining racks are now put on the bottom of the vat and covered with cheese cloths, the curd is cut into cubical-shaped pieces of 5 in. × 5 in. and lifted on them, and cut again and turned over several times during the

next two or three hours, when it is ready to grind; then it is passed through the curd mill, the salt well mixed, and filled into the hoops, in the interior of which a cloth has been placed. It is then carried to the press-house and placed in the cheese oven, where it is kept warm to promote drainage. At night it is turned into a clean dry cloth and put back in the oven; next morning it is again turned and put under press, where it remains four or five days, or until dry, being turned each morning into a dry cloth. When taken from under press, a calico binder is pasted on it, and it is carried away to the curing-room. Each end is rubbed twice with soft grease such as the fat of bacon, or oiled

Fig. 5.—*Ripening Room.*



with linseed-oil twice to prevent the rind cracking, after which it is turned daily for the first few days, then every other day for a month, then twice a week for the ensuing month, when it should be ready for sale.

The Late Ripening Process.—The evening's milk is by some sieved into shallow pans and placed on the dairy floor. In the morning the cream is carefully skimmed off, and most of the milk transferred to the cheese vat. By others it is sieved direct into the vat, and in the morning the cream taken off. The morning's milk is then added, and the cream, slightly warmed, is passed through the sieve with it, and as much of the evening's

milk is heated up to 130° F. by floating the pans on a boiler of hot water as will raise the whole of the milk to 90° F. Where vats are in use the night's milk is cooled down, so that it will be found at a temperature of 65° to 68° F. in the morning, and after the addition of the morning's milk the temperature is raised to 90° F.

The annatto is run in at this stage and well stirred, and the rennet added, and another stirring given, sufficient being used to produce a curd ready to cut in sixty to seventy minutes. The top of the curd is then turned over with the skimmer, and the breaking up is proceeded with and carried on until the pieces of curd are the size of small peas; this should take thirty-five to forty minutes. The temperature is then raised to 94° or 95° F., the mass being kept well stirred until it is thoroughly and uniformly heated; then it is allowed to settle, the curd sinks to the bottom of the vat, and is lightly pressed with a board, and it is then gathered up to one end and the whey run off. The development of acidity is prevented as much as possible by scattering a few handfuls of salt on the curd as the breaking-down proceeds, and by drawing the whey as soon as it can be done. Two pieces of the racks are then put in the bottom of the vat, covered with cheese cloths, and the curd cut into cubes and lifted on them, and turned and cut at intervals of twenty minutes. In three-quarters of an hour it is weighed, broken up by the hands, and salted in the proportion of 8 to 9 oz. of salt to 20 lbs. of curd, then allowed to stand with a light weight on for about an hour longer, being turned over once or twice during that time; then it is passed through the curd mill, filled into vats, lined with cheese cloths, carried to the press-house and placed in the cheese oven, and a 56-lb. weight put upon it. Skewers are inserted through holes in the sides of the vat, and every now and then withdrawn and re-inserted to facilitate the drainage of the whey. At night the cheese is turned into a fresh cloth and put back in the oven; next morning it is again turned, a fresh cloth is used, and it is put under press. Each following morning it is turned into a dry cloth, and more pressure is applied. In four or five days it should cease to drip, and is then taken from under press; the use of skewers continues for the first three days.

A calico binder is pasted on the cheese, and it is carried to the curing-room; each end is greased twice, as in the medium-ripening process, to prevent the rind cracking; it is turned daily for the first week, then every other day for a month, then twice a week until the cheese gets firm and set, when once weekly suffices until its time comes to be sold.

The Stilton Cheshire Process.—The practices adopted are to

arrange to have the night's milk at a temperature of 64° to 66° F. in the morning, to skim it and to add the cream and morning's milk, and set together at 86° F., using enough rennet to produce a curd ready to cut in forty-five minutes; then to break down the curd to the size of small peas; after settling, to draw the whey as soon as possible, to prevent much acidity developing; then to place it on the draining racks, and to cut and turn several times, leaving the salting until the curd is ready to grind, when it is passed through the curd mill, and salt used in the proportion of 8 oz. to 20 lbs. of curd.¹ It is then filled in hoops, previously lined with a cheese cloth, and carried to the press-house, being turned over at night and again next morning. A light weight of $\frac{1}{2}$ or $\frac{3}{4}$ cwt. is then applied, and continued for three days. Then it is put under press for two days more, being turned each morning, when it is taken away if the drainage has ceased or not, bound, and carried to the cheese-room and treated like other cheese. The object is to produce an open flaky curd, in which little acidity is developed, but which at the same time is dry enough to ensure its proper ripening. It is preferred that the cheese should not have ceased dripping when it comes from under press, for if it has, it is an evidence that too much acidity is present, and that consequently the curd will be close, and it is known that the growth of the mould or "fade" is very much checked by a texture of that kind.

The green fade is a minute fungus growth, the spores of which are, no doubt, received in the milk from the air in the same way as the germs of the lactic ferment. Like other fungi, they only live and increase when they find conditions suitable to their development, and these are present in a cheese made on this method; whereas in cheese made on the other methods described, there is too much acidity in the early ripening process, and too close a texture in the medium and late processes. This class of cheese is generally purchased in a new state, and the buyers complete the ripening in the warm cellars of their own warehouses, often obtaining a profit of 15s. to 20s. per cwt., from which has to be deducted the loss in weight, and a percentage for faulty cheeses which refuse to go faded and which are cleared below cost price. Other makers mature it in their own rooms and reap the full benefit of their skill.

It will be seen that there is a decided difference between the methods of making. In the early ripening system a larger quantity of rennet is used, more acidity is developed, and less pressure

¹ Part of the curd is kept over each day to mix the following day with the new curd at the time of salting, the proportion being 1 to 6 in summer and 1 to 4 in autumn.

employed than in the other processes. In the medium ripening process a moderate amount of acidity is developed to cause the natural drainage of the whey from the curd when under press. While in the late ripening system the development of acidity is prevented as far as possible, and the whey is got out of the curd by breaking down finer, using more heat, and skewering when under press. In the Stilton Cheshire process a larger quantity of rennet is used and less pressure is employed than in the medium or late ripening systems. In other points the various practices closely resemble each other.

If the preceding directions are followed with care and judgment, and scrupulous cleanliness is observed in all the vessels and places used, entire success may be attained with perseverance. A few additional precautions and directions such as the following may usefully be observed.

When the milk is found to be over-ripe in the morning, more rennet than usual should be used, instead of less, as is often the case. If less is used, the curd is difficult to separate from the whey, and the delay causes far too much sourness; while if more was used, the separation would be quicker, the whey could be drawn sooner, and salt might be applied to the curd as soon as the whey is drawn to check any further development.

When the milk is not ripe enough in the morning, as it is not when the nights are very cool in early spring or autumn, the whey should not be drawn off till sufficient acidity is developed in the curd; if it is, the development is slower and more irregular.

In the spring or autumn, when acidity is deficient, it is a good plan to keep some curd over to the following day, and to mix it with the new curd at the time of grinding and salting. The curd kept over should be put into a vessel and kept covered with whey until it is wanted.

When the milk is over-ripe, in the old process of setting in shallow pans, which is still sometimes followed, the evil results would be minimised by using the required amount of morning's milk for heating up to 130° F. instead of the evening's milk.

In the spring of the year less acidity should be developed than in the summer or autumn, for the milk is poor at that season, and the texture of the cheese is spoiled if too much acidity be present. The presence of taints and impurities may be in a great measure counterbalanced by a thorough aeration of the curd on the drainers, and by the presence of as much acidity as the maker thinks it safe to develop. Weakness of acidity causes a weak-flavoured cheese, while overmuch acidity causes a sharp flavour. When a cheese is twenty-four hours old it is possible

to tell if it will be good or bad ; if it is concave (hollow) on the top when turned over, it is good ; if convex (rounded), it is bad, and the cause should be instantly sought for and corrected in subsequent makes. Too much moisture in the curd or too little acidity present is usually the cause, and the practices that affect these points should be carefully watched.

Acidity has a marked effect on the time occupied in ripening, and on the keeping quality when ripe ; when a moderate quantity is present, ripening is quicker, but the keeping quality is not so good. When very little or none is present, ripening is slower, but the keeping quality is thereby improved. The quantity of rennet used, and the temperature at which the cheese-room is kept, also affect the time occupied in ripening.

XXIV.—*The Practice of Stilton Cheese Making.* By G. KEMP, Manor House Farm, Sedgebrook, Grantham.

THE earliest notice we have been able to find of Stilton cheese making is in Marshall's *Rural Economy of the Midlands*, published in 1790, in which he states that—

Leicestershire is at present celebrated for its cream cheese, known by the name of Stilton cheese. This species of cheese may be said to be a modern produce of the Midland district. Mrs. Paulet, of Wymondham, in the Melton quarter of Leicestershire, the first maker of Stilton cheese, is still living [1790]. Mrs. P., being a relation or acquaintance of the well-known Cooper Thornhill, who formerly kept the Bell at Stilton (in Huntingdonshire, on the great North road from London to Edinburgh), furnished his house with cream cheese ; which, being of singularly fine quality, was coveted by his customers ; and, through the assistance of Mrs. P., his customers were gratified, at the expence of half-a-crown a pound, with cream cheese of a superior quality, but of what county was not publicly known. Hence it obtained, of course, the name of Stilton cheese. At length, however, the place of produce was discovered, and the art of producing it learnt, by other dairywomen in the neighbourhood. Dalby first took the lead ; but it is now made in almost every village in that quarter of Leicestershire, as well as in the neighbouring villages of Rutlandshire. Many tons are made every year. Dalby is said to pay its rent from this produce only. Thus, from a mere circumstance, the produce of an extent of country is changed ; and, in this case, very profitably. The sale is no longer confined to Stilton ; every inn-keeper within fifteen or twenty miles of the district of manufacture is a dealer in Stilton cheese. The price at present is 10*d.* a pound to the maker, and a shilling to the consumer, who takes it at the maker's weight.

The home of the Stilton is still in North Leicestershire, having Melton Mowbray as its headquarters. It appears to have been a product almost exclusively of that district for a number of years, and was made by the small farmers and graziers, many of whom devoted their entire attention to its manufacture,

and the result was a high standard of excellence. The best Stiltons made in the houses of the small farmers and graziers of thirty or thirty-five years ago are not excelled, if equalled, in the present day. The general standard of Stilton cheese ought not to be lower to-day than it was thirty years ago, with all the appliances and instruments in the shape of thermometers and hot water heating apparatus now at the command of the cheese-maker. If the same steady attention and time were given to the manufacture now as were given in the time spoken of, the general standard would be considerably higher than it was then; and it behoves cheese-makers, in face of the keen foreign competition, to make Stilton cheese of the best quality only. To do so four things are absolutely necessary—viz. proper buildings, utensils, constant supervision in the manufacture, and perfect cleanliness.

Buildings.—There should be four separate apartments:—the dairy, for setting the milk and draining the curd, which should have a temperature of never less than 55° or more than 60°. It must be fitted with a stove, or hot water heating apparatus, to keep the temperature up in cool weather—12 feet by 14 feet is a nice size.

The next apartment is the draining-room, where the curd is taken immediately it is put in the mould (called by cheese-makers the hoop), until such time as it is ready to put in the binder. This room must have a temperature of never less than 63° or more than 67°; 65° is the proper heat. During April and, say, the first two weeks in May, if the heating apparatus is not very perfect, it will be advisable to increase the temperature in these two rooms from 3° to 5°, as the outside temperature varies. *It must be borne in mind that a cheese in the hoop if once starved is spoilt.* The dairy and draining-room must have cement floors and trapped drains; there must be no crevice for the whey to get in, as the odour from stagnant whey is very objectionable, and all offensive smells must be carefully avoided. The size should be 8 feet by 12 feet, and it should have one entrance only, as it is important to keep the temperature of this room very even.

No. 3 is the drying-room, where the cheese is taken after the binder is taken off and the coat is formed. This room (size 14 feet by 10 feet) must have a temperature of from 50° to 55°, and be fitted with windows to open or shut as the draught is required. All windows must have small perforated zinc as well as glass, also inside shutters to exclude the mid-day light. This direction applies to all windows throughout the buildings.

No. 4 is the storing-room (size 14 feet by 24 feet), which

should be so contrived as to have regulated draughts. It is a great advantage if the floor is about two feet below the surface of the ground, as the air of this room requires to be somewhat moist. The temperature should range from 50° to 60° ; if the cheeses are wanted to ripen quicker it may be raised to 65° , or even a little higher; but it will be well to bear in mind that a quickly ripened cheese will not keep so well when cut as one that has ripened more naturally.

All the buildings should have a northern aspect, and must be protected from the full force of the summer sun; no shade is so good as that of trees.

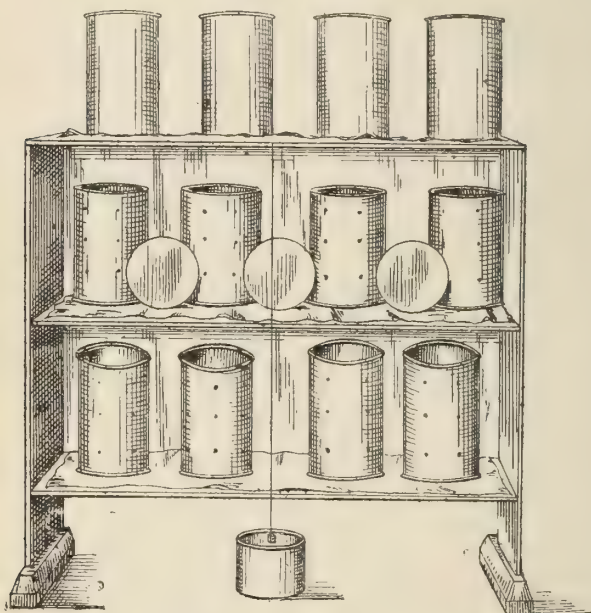
In the foregoing directions as to buildings it has not been the intention to give a design for a Stilton cheese-making factory, but for such structures as are required for a dairy of about twenty cows, and as a rule attached to the house of an ordinary farmer or grazier.

Utensils.—The utensils required are, in the dairy or setting-room, milk coolers, a setting-pan, strainering, draining-trough, and moulds or hoops, and, if the quantity of curd is large, say, 30 cows—a curd-breaker. The setting-pan is either single or double skinned: if double, the space between the skins can be filled with hot or cold water as needed; if single, it is best made of tinned steel. The single is preferable; it is much handier to clean and to move about. Strainering is the ordinary butter-strainering cut into squares of about 48 inches, and can be obtained of almost any linendraper. The draining-trough is best made of wood lined with sheet-lead, sides rather sloping. It must be fitted with tap to let off the whey, and also a movable perforated tin bottom, raised half an inch to allow the whey to run away freely—size 6 inches deep, 22 inches wide at bottom, and 28 inches wide at top, with a length according to number of cows. The hoops are circular, made of tin, 13 inches high, $8\frac{1}{4}$ inches diameter, sides perforated to admit of skewering; if well filled they will make a cheese when ripe of 15 lbs. weight.

Draining-room.—The drainer is of wood, $1\frac{1}{2}$ inch thick, 4 feet 3 inches high, 5 feet long, 11 inches from front to back; the front open, the back closed, with top, middle, and bottom shelves—the bottom shelf 1 foot from the floor, the remaining space equally divided. Each shelf must have a groove cut all round half an inch from the edge to drain off the whey, and a hole through the centre of the front groove through which to pass a string to conduct the whey into a vessel placed under the bottom shelf. A deal table is required to place the cheeses on during the time the drainer is being brushed, washed, and clean cloths put on the shelves.

Manufacture.—In the first place, the milk *must* be produced by cows fed on good old grass pastures—which ought to have a clay subsoil—supplemented, it may be, by a little cake. Too much cake is not good : about 2 lbs. per cow per day is quite sufficient, unless the pasture is very poor, and then a little more may be given. It is not, however, advisable to attempt Stiltons at all on a very poor pasture, as they are almost sure to be of poor quality. On the other hand, a very rich pasture is to be avoided by all but the most expert cheese-makers, and even by

Fig. 1.—*Drainer.*



them it is a risky undertaking. It has been generally supposed the pastures of the district named have had much to do with the excellence of the Stiltons made there—in fact, some people have gone so far as to say they cannot properly be made in any other district. This, however, is a mistake. But we wish to say that a true Stilton is not made from unskimmed milk only, but has a certain amount of cream added to it.

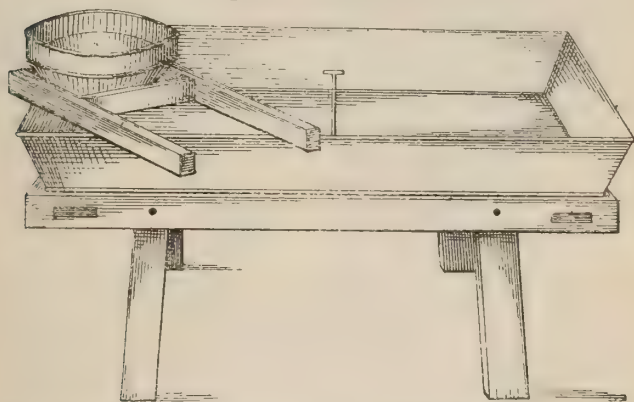
The evening's milk is cooled to 65° at the time of milking by means of Lawrence's refrigerator, and set until morning in a tin vessel 8 inches deep, 28 inches wide, and 40 inches long, having a hole in the bottom closed with a plug, the stem of which is long enough to stand above the milk when the vessel is full. It must

rest on a wood frame 18 inches high, to admit of a bucket being placed underneath in which to draw off the milk.

In the morning draw off one sixth of the milk through the plughole and put it out of the way (this should not be put in the setting-pan); then draw off a tin bucket full and immerse it in hot water till it is raised to 110° , stirring occasionally to prevent skimming on the top. Pour it in the setting-pan, draw off another bucketful, and treat in the same way until the vessel is empty. The cream which is left to last must not be raised more than 98° . Add the whole of the morning's milk after it has been drawn from the cows half an hour, care being taken that the cream does not rise on the new milk—this can be prevented by an occasional slight stirring.

The milk in the setting-pan should be 84° or 86° , according

Fig. 2.—*Milk Cooler.*



as the outside temperature is high or low at the time the rennet is added. Be careful to mix thoroughly; cover the pan with a light cloth to prevent the heat escaping. Home-made rennet is usually employed, but Hansen's rennet tablets answer equally well, though they are more costly. Any one who is not able to make his own rennet is strongly advised to use the tablets, as they are very clean and simple, full directions for use being given with each package.

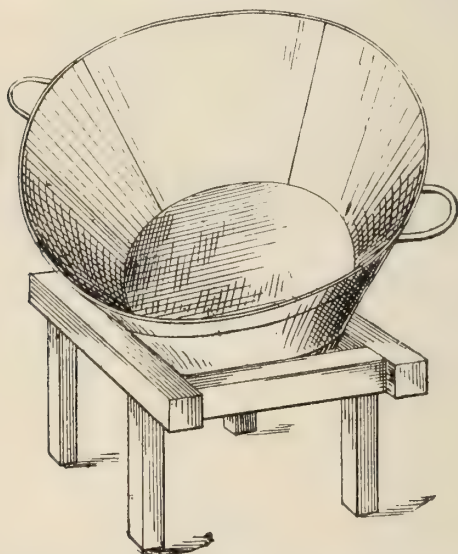
The milk will be coagulated in from ten to fifteen minutes. In two and a half hours from setting, the curd will be ready to put in the draining-trough; this is done by gently ladling, with a shallow tin bowl holding about half a gallon, the whole contents of the setting-pan into the draining-trough (rods of iron or wood must be placed across the top of the draining-trough

to carry the edges of the strainering), in which a piece of *wet* strainering about 48 inches square has been previously placed to receive it. One piece of strainer will hold the curd of about seven gallons of milk.

When the curd is all in the draining-trough, tie the four corners of the strainer loosely together: let the whey stop in the trough half or three-quarters of an hour before drawing off. The curd must then be tied closer together; this is done by placing the four corners of the strainer together.

In tying up the curd grasp the strainer with the left hand close to the curd, and with the right hand take one of the loose

Fig. 3.—*Vat.*



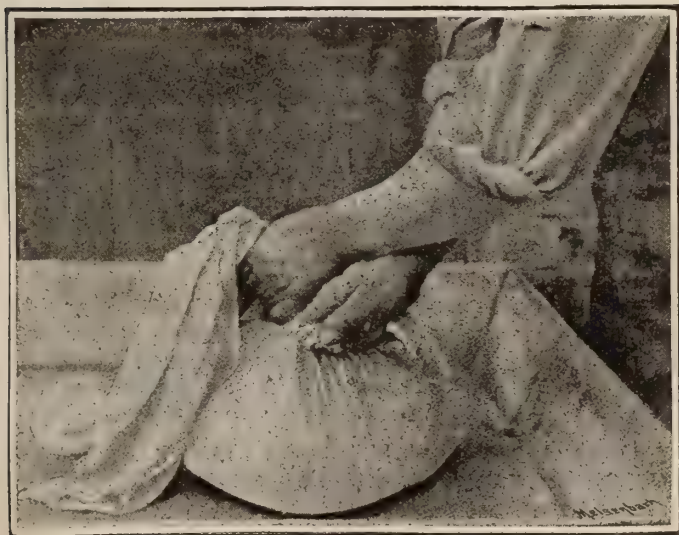
corners and bind the whole tightly together *under* the left hand. This apparently simple operation will require some practice before it can be neatly and deftly done. Very great care must be taken *not to crush* the curd at any time, or the whey will run white, which must not be allowed. The main object is to keep the whey as green as possible.

The tying will want repeating three or four times during the day, until the curd is sufficiently firm to cut into blocks the size of half a brick, which will be from six to seven hours from ladling. The pieces must be laid over the bottom of the trough, and in two hours each piece must be carefully turned over, and the whole covered with a light cotton cloth until the following

Fig. 4.—*Curd in the Draining Trough.*

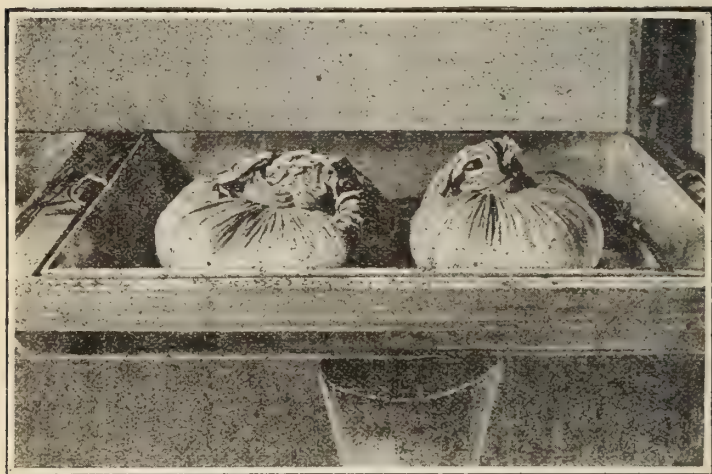


Fig. 5.—*Tying up the Curd.*



morning. It is now ready to put in the mould (or hoop), but, before doing so, the pieces must be broken to the size of a walnut, mixing salt in the proportion of 8 ozs. of salt to 30 lbs. of curd. When the hoop is being filled, the curd in the hoop should be occasionally lightly pressed with the hand, and when full it must at once be taken to the draining-room and put in the drainer. Before commencing to fill the hoop it will be necessary to place it (the hoop) upon a piece of board, on which to carry it to the drainer; a sinker made of wood, and just sufficiently large to pass easily *inside* the mould, being placed on the top of curd. As a rule, no other weight should be used, though sometimes it is necessary to do so. No directions as to weights can safely be

Fig. 6.—*Curd tied up in Draining Trough.*



given: the knowledge must be gained by experience and observation.

After standing three hours, the mould containing the cheese must be turned over on its opposite end, the sinker again being placed on the top. This must be repeated at regular intervals three times a day. At each time of turning on the second and two or three succeeding days the cheese must be skewered through the perforations in the sides of the hoop with a steel skewer about twice the thickness of an ordinary knitting-pin: the outside of the mould containing the cheese must be washed with tepid water, and the drainer thoroughly brushed and washed with hot water every morning.

If the temperature (65°) has been kept even, and the turning

and skewering properly attended to, the cheese will be ready for the binder about six days from making. Here again no precise instructions can be given. The cheese should feel rather elastic under pressure of the fingers; it will also have left the sides of the mould slightly, so that the latter easily slips off. When you are satisfied the cheese is ready for the binder—which is a piece of calico as broad as the cheese is high, and an inch or two longer than will encircle it—place the mould containing the cheese on a table, take off the mould, and with an ordinary table-knife commence to fill up the little holes in the sides of the cheese by slowly drawing the flat side of the knife up and down, applying a slight pressure in doing so, till all the holes are filled up and the side of the cheese is smooth and even.

The binder is now tightly pinned around, and the mould, after being thoroughly cleansed, is again placed over the cheese. The next day this binder must be replaced by a clean one, the side of the cheese being again rubbed over with the knife, and the mould replaced. A clean binder must be put on every day, the mould being discarded after the second day. In very drying weather a light covering must be used for all cheeses in binders.

On the first appearance of coat the knife must no longer be used. In about six or eight days the binder will begin to have dry places upon it, which is a sign the coat is beginning to form. To the eye it will look like little white crinkled patches, but in a few days it will spread all over the cheese, and the coat will then be fully formed. The binder must be used until the coat is perfect.

In very damp thundery weather “slip-cote”—a soft greasy state of the cheese, which will very soon be known by experience—will form instead of the true coat; this must be scraped off with the knife as soon as perceived, and the cheese removed to a cooler place. The best place for the coating process is the setting-dairy, on shelves placed along the wall, except in very hot weather, when a cool moist room is best, with a temperature of about 55°. The storing-room, which at this time is not fully occupied, is a good place, if care is taken to exclude the mid-day air.

When the coat is fully formed the cheese must be taken to the drying-room, and placed on deal shelves. It now only requires turning every day, and careful attention paid to cleanliness and draughts. The draught should be rather dry and free, but care must be taken that it is not too free, or cracking of the coat will take place, which must be studiously avoided, or the small cheese-fly will deposit its larva in the tiny cracks, and the cheese will be spoilt. The coat should be kept in the same white state as

when it came out of the binder. If there is too much moisture in the atmosphere a black mould will form on the coat. This should not be allowed; more dry air must be admitted, and the cheeses placed further apart on the shelves. After it has been in the drying-room about twenty days the coat will be firmly fixed, and the cheese must go to the storing-room, and ranged in rows on deal shelves. Here it will only require daily turning, the shelves kept quite clean and free from mites, and a careful attention paid to

Fig. 7.—*Ripe Cheese.*



draughts and temperature. In summer the light will have to be excluded at mid-day.

A Stilton is generally ready for the table in about six months from making. When ready for the table it should have a crinkled light drab coat, it should cut easily with a knife, and if bored it should leave some of the rich soft cheese upon the surface of the borer. It should be well veined with blue, and have a flavour and aroma not to be found in any other cheese of British or foreign make.

XXV.—*On Weighing Live-Stock.* By ALBERT PELL.

THE universal use of the weighing-machine for live-stock in the United States of America, and the almost universal rejection of it in the mother country, require some explanation. It seems hardly possible to give one that will be sufficient and satisfactory. Up and down the streets, along the side walks, in every town in the cattle districts of the United States, not one, but several Howe or Fairbank platform machines are seen in constant service. If coals, or lumber, or hay, or corn, or fodder, are marketed by weight, they are so treated for the sake of convenience, despatch, and absolute accuracy in one particular. Every one even in England, in practice, makes this admission, but animated nature escapes the ordeal. In America there is no grace for hogs or oxen. A waggon-load of live hogs goes to the scales as a matter of course. There the ox telling his weight appears to know his weighing machine, as well as the ass his master's crib; but over here the ox does not tell, and his owner does not consider. He guesses and "goes away backward." Why is this? Are we, like the Jews, a perverse people? We may or may not be, but we certainly are stiffnecked as to the rule of thumb. Two motives seem to impede progress: self-interest on the part of the expert, and conceit on the part of his victims. One class of experts, the butchers, are continually checking their judgment of live cattle by weighing the carcasses; they are therefore better guessers than those who feed for them. The feeder however, if he is ever so poor a judge, likes to be thought a judge, and feels that if he goes to the scales for information it is an admission in the face of all the world of incapacity in his business. He is not sure, too, that the experts, if they come to know that he has "tried the machine," will not leave him out in the cold as knowing too much, or at all events spying into their peculiar arcana; so to maintain his character he disavows any such curiosity, avoids, in a noble spirit, the test of the balance, and thus, purposely purblind, haggles with those whose method of business enlightens them. So thus it comes that he is worsened, and they, as a rule, bettered.

But even in Great Britain there are differences. A return ordered by the House of Commons to be printed December 21, 1888, headed "Cattle (Places of Sale)," which exhibits the general indifference or antipathy to the use of the weighing machines in the markets, describes weighing as taking place only "in exceptional cases;" adding, "neither purchaser nor vendor will use the machine;" "the machine has only been

used once;" "none are sold by weight," and so on. At Kidderminster, however, the return is, "the practice of weighing is very particularly adopted, and is on the increase." At Liverpool, December 19, "the number of cattle weighed on the bridge in Stanley Cattle Market has considerably increased within the past two months, and to the best of my knowledge the sales of cattle by live-weight have also increased within the same period." From the Metropolitan Market, Islington, "many animals are now weighed, some before sale, but the greater portion after sale." From Macclesfield, "all the cattle sales by auction; the animals sold by weight are weighed immediately after the sale." From Rye, "since December last, when a weighing-machine was fixed in the market, there has been an increasing practice to weigh the animals sold." From Edinburgh, "except at the Haymarket (Swan's Sale Yard) the practice of weighing cattle is not generally in vogue." From Dublin, "a scale has been erected for weighing cattle. It is not apparently used, so that sales are made by hand, and not by ascertained weight." This is the reply made by the Market Authority to the Board of Trade Circular; but evidently there has been some weighing and sales by weight, as appears at the end of the return, from information supplied to the Board of Trade by the *Dublin Farmer's Gazette*, which gives quotations per cwt. for live-weight of first, second, and third qualities of bullocks and heifers, and in the same table adds the dead-weight prices for the three qualities. The *Dublin Farmer's Gazette* also furnished a second return, showing the number of beasts sold weekly by live-weight in Dublin Market from August 2, 1888, to December 27, 1888, with the total live-weights of each lot, and the price made per cwt. live-weight. From this we learn that no less than 1,275 beasts were sold during that period by live-weight, and the prices made recorded. It would seem from this fact that the Market Authority, in stating that sales at Dublin Market were made by hand and not by ascertained weight, were insufficiently informed, or ignored the weekly sale by live-weight of a total of 1,275 beasts.

The return from Newcastle-on-Tyne states that weighing live animals on the market machine is practised only "on rare occasions," but a letter dated December 21, 1888, from the City Treasurer's Office, in reply to a personal inquiry, shows that from February 21, 1888, to June 5, 1888, 316 head of cattle were weighed alive; from June 8, 1888, to March 25, 1889, 419 head; from April 1, 1889, to October 12, 1889, 224 head: or 959 in all. In addition, 1,427 live pigs were weighed, proving that the machine is not boycotted, and that it is affording a sufficient

trial upon which the local feeders and butchers can come to a reasonable conclusion on the merits of the system. The letter covering the return states "that there is no opposition whatever against the weighbridge."

Once north of the Tweed and this pride or prejudice fades away, and in Edinburgh and elsewhere in Scotland the weighing machine is in common use at the auction of store as well as of fat cattle. It does not appear that stock are bought by the stone or pound "on the foot;" but they go over the machine, and when they come under the hammer their live-weight is exhibited so conspicuously that those who run may read; and any who think the record of service may avail themselves of it as an assistance to their judgment in computing values. Beyond all doubt the butchers as well as the feeders find this method of service to them. The character and quality of fat animals brought to the market by a feeder of any repute are perfectly well known to buyers frequenting the market, and their condition is known as a rule to reach or fall short of the standard of excellence, which distinguishes winter-fed Scotch beef, in a measure peculiar to the farm or food which has produced them. The proportion of offal to carcass is thus not a matter of question, and there remains the gross weight only for speculation. This is narrowed down to certainty by weighing.

From Edinburgh, under date October 24, 1889, Messrs. John Swan & Sons write in reply to a personal inquiry that the machine in the cattle market weighs six to eight beasts at a time, but that it is only used occasionally for cattle, and not at all for sheep. The fee is 2*d.* a beast. Meanwhile Messrs. Swan & Sons sell 300 to 500 fat cattle weekly, on their own premises, with live-weights ascertained and posted up, and the weights are appended to accounts of sales. Occasionally in Canadian consignments the weights on loading in Canada are transmitted to Messrs. Swan, and sometimes, but very seldom, they are asked by the Canadian consignees to state the weight of the cattle "on foot" in Edinburgh Market, together with the price made per live stone.

Messrs. Swan also write that in their opinion the weighbridge materially assists in furnishing a true and reliable guide to value, and assists in establishing the approximate relative values of different breeds of cattle, and thus provides a standard for trade purposes. It certainly, they say, expedites business, and, while the Scotch butchers and salesmen show no hostility to the system, the feeders and sellers of cattle generally approve of it. They find other middlemen beginning to make a general use of the machine, and they give the names of several Scotch

feeders and landowners who have fitted up machines in their own premises.

The line that Scotchmen are taking is evidently a practical one on the matter, and seems likely to lead up to a customary resort to weighing in the cattle trade.

As a matter of course, in the infancy of any method, however good, as much is not got out of it as when practice has made it perfect; and even then artifice and roguery come into play and have to be guarded against. Such tricks as this have been played in the United States. A waggon of hogs is bought by a packer; the seller takes them on to a public weighing-machine, where the clerk gives him a signed ticket of the gross weight. Having delivered the hogs at the slaughter-house, he returns to the weighing-machine and receives an endorsement from the clerk of the weight of the waggon empty; with this he appears at the buyer's office, and—deducting the one from the other—is paid the stipulated price per pound for the net weight of live hogs. But it so happens that the packer looks in at his place of business, and, happening to see the hogs there alive together with the weight ticket, is staggered at the figures. A reweighing justifies his suspicion of foul dealing. He proceeds at once to the clerk who weighed for the seller, with his signed ticket of weight in one hand and in the other the record of the actual re-weighing of the animals on his own premises, and asks for an explanation of the discrepancy. The clerk gives it with no difficulty. “Look,” says he, “at my ticket of gross weight, of waggon with hogs on it. Do you see that little ‘on’ in the corner?” “Yes, I do now you point it out,” says the buyer. “Well, now do you see the little ‘off’ in the corner of the endorsement of weight of waggon with the hogs out of it?” “Certainly; but what of that?” “Only this,” says the clerk: “your seller is a stout man and he was ‘on’ the waggon when the pigs were weighed in it, and ‘off’ the waggon when we weighed it empty. This accounts for the difference. You have paid for his live-weight as well as that of his hogs.”

Tricks, however, can be played on the seller in weighing carcasses, but in neither case is this sufficient reason for surrendering the practice of weighing.

Although it must be admitted that there is no general disposition to put live animals on the scales, and that the proposal does not “go down” rapidly in England, still some progress has been made in this matter within the last two years. In Volume XVIII., Third Series of the *Journal of the Bath and West of England Society*, there will be found a most useful and

well-written article on Selling Stock by Live-weight; ¹ with an account of the early attempts to arrive at exactitude in weights by calculations depending on measurement, worked out in tables constructed for that purpose by experts, and a reference to "Cary's well-known cattle gauge," based upon the calculations of Dr. Wollaston. There is no doubt the article published by Sir John Lawes and Dr. Gilbert in 1860 (Royal Agricultural Society's Journal, Volume XXI. Part II.), giving the results of a series of elaborate and exhaustive experiments on the composition of oxen, sheep, and pigs, first established a reliable standard. In later times an important part has been taken by Mr. Westley Richards in pushing the system to the front, in bringing its adoption within the reach of the general public, and in exposing the loss which feeders suffer from a reluctance to give it a trial. In order, however, to derive the advantage of substituting the system of the scale for the rule of thumb, legislation was needed. Thanks to the extraordinary pertinacity and acuteness of Mr. Westley Richards, who, in season and out of season, has never let the subject drop, an Act has been got through Parliament by which this advantage is secured, and every market of any importance now gives, or is bound to give, facilities, for those who like to avail themselves of them, for weighing their live-stock.

In addition to this, the scale-makers are turning their attention to the new requirement, and manufacturers have got out an extremely convenient weighbridge furnished with automatic gear for stamping on a ticket, after the fashion of railway tickets, the weight to a pound of the animal standing on the platform.

As an assistance in computing values to those who use the scales, Sir John B. Lawes has prepared and printed a very elaborate and complete set of tables for the conversion of imperial stones of live-weight into cwts., scores, and 8 lb. stones of dead-weight, adjusted to different percentages of carcass in live-weight, and ranging over light and heavy fat cattle. There are in all 84 of these tables, the first three of which show at a glance, without any calculation, the money value of *store cattle*, according to their live-weight in stones of 14 lbs., and to the price per stone of live-weight agreed upon; and they are applicable for a range of live-weight from 40 to 90 stones, and for a range of price commencing at 2s. per stone, and advancing 2d. per stone to 5s. The remaining tables, 81 in number, show the dead-weight and the money value of *fat cattle*, according to their live-weight, to their condition as represented by percentage of carcass in live-weight, and to the

¹ *Journal of the Bath and West of England Society*, Vol. XVIII. 3rd Series, "Selling Stock by Live-weight," by R. Henry Rew.

price agreed upon. These tables are applicable for a range of live-weight from 50 to 130 stones of 14 lbs., for a range from 50 to 65 per cent. of carcass-weight, and for prices ranging from 4*d.* to 8*d.* per lb., carcass-weight, advancing $\frac{1}{4}$ *d.* per lb. from 4*d.* to 8*d.* The dead- or carcass-weights are given in cwts. of 112 lbs., in scores of 20 lbs., in stones of 14 lbs., in stones of 8 lbs., and in lbs. These tables are to be procured at 12 Hanover Square. Besides this, is "The Pocket Ready Reckoner" of Mr. Thomas H. Thursfield, of Barrow, Broseley, Shropshire, and "The Conversion of Weights Tables" by Mr. Alexander Jolly, Simpkin, Marshall & Co., London; also a useful single card by Mr. Robert Anderson, Secretary to the Cirencester Chamber of Agriculture.

The contention that, from the very nature of the two things corn and cattle, the use of balances in determining prices of the former would be out of place with the latter, is absolutely absurd; so is the practice of selling a live animal for a price which is left to be determined some time after the transfer has been effected by weighing only a portion of the animal, viz., the dressed meat, or so much of it as local custom admits to be dressed meat.

Did any one ever hear of a quarter of wheat changing hands on market after this fashion—with the price left to be determined by the amount of flour the miller might dress out of the grist? Such a proposal has possibly never been made by any one in business. The buyer and the seller from outward appearances come to a conclusion in their own minds as to the percentage of offals and that of flour in the sample. The condition is ascertainable by feel and smell—there is no talk about the amount of hypothetical flour. A word or two may pass about condition, damp or dry, and there may be a contemptuous sniff from the dealer's nose after he has applied it to the bag—that is all. Some conventional, almost automatic, examination of the sample, and then the vital question, "How much a quarter of thirty-six stones?"—i.e. how much by weight—"live-weight," for the grain is as much alive in its way as a bullock, till it is knocked on the head by the mill-stones.

To carry the comparison further: We have the breeds of wheat, each with well-known comparative values—"White," "Red," "Rivetts," "Taganrog," "Californian," &c., modified by the locality which produces them. So of cattle: "Polled Angus," "Devons," "Herefords," "Shorthorns," modified by the locality and the feeder producing them. If "Chidham" wheat grown in Argyleshire would be poor stuff, equally so would Devon beef coming off the bleak hills of that county.

We have damp wheat, rough wheat, smutty wheat, on offer, as we have rough beasts, lean beasts, scalawags, stags, bulls.

Even age enters into the consideration of value alike in both commodities. Old wheat and old mutton are in higher estimation than new wheat and young mutton.

But none of these factors of value are allowed to impede the sale of grain by "live"-weight. Why then should they be allowed to operate against the universal sale of beef by live-weight? It is for the supporters of the unmethodical speculative system to find the answer, and demonstrate the worthlessness of the motto of this Society, "Practice with Science."

The first word, however, in our motto gives rise to some reflection on the attitude of owners of land in this matter. How far are they (members probably of this Royal Society) backing up the motto with their own practice? Nothing but practice in the new method or system in England of weighing live cattle can develop it into full usefulness, and this practice cannot be obtained without appliances. The absence of these appliances as part of the necessary equipment of large agricultural estates or holdings is of serious importance, and may be justly deplored. There is no lack of worthless implements overgrown with nettles or stored in out-of-the-way corners—implements whose character for efficiency has been bolstered up by testimonials, florid illustrations, and fine phrases, *ad nauseam*—but the one apparatus whose performances have been of proved value and universal use among people emerged from barbarism, finds its representative inside the offices only of the landowner, weighing his butter, and his coal, and his stable fodder, his letters and his physic, but excluded, though its cost is moderate, from a sphere of action, outside the purlieus of the mansion, conducive to economy and instruction. There is the estate office with its staff of clerks and books ready at hand; and while all difficulty in drawing up tabular statements is thus removed, the gauge of the feeding quality of every field, all farm produce, and of every description of artificial food is wanting so long as the weighbridge for live-stock is not in its place.

The missing link in investigation would be supplied if the live-weight scales were periodically called upon to declare the progress of the animals on the farm, and its revelations entered up in the office books. In this age of fierce competition we can hardly afford to neglect any educational opportunities. The whole world, as it has poured its grain into England, seems on the eve of following suit in live animals, with the certainty of a rivalry in which that party must go down which neglects exactitude in its business practices and the adoption of the

system which furnishes means for exactitude. Farming is said to be a business of small economies; now small economies can only be brought about by nice observations of petty details; and as regards progress in the growth and breed of animals the only reliable telltale is the balance. The advance in public opinion since Mr. Rew's paper was published, as expressed by legislation, together with the record of recent experience in the adoption of the system, may be usefully brought under the notice of agriculturists. There seems to be no occasion for entering further into argument in favour of its adoption, or for reviving contentious discussion with those who may be indifferent or actively opposed to it. It is no longer a question whether or no live animals will be weighed for trading purposes in Great Britain; that question is settled by the fact that thousands are so treated, and the spread of the system is thereby removed from the field of discussion to that of actual application.

It is obvious, therefore, that at the present moment what is needed in the way of literature is a statement of practice and results, as far as they can be gathered from those who are making use of the weighbridge in the course of business.

A study of this practice and its results reveals several glaring defects or contradictions in the statistics of the cattle business. Taking for instance the quotations of prices in the Metropolitan Islington Market, there is the best possible reason for believing that they are utterly worthless as a basis of prices. Either the price per stone quoted is beyond that which the beasts have made, or the butcher's estimate of weight is below the reality. The evidence of Sir J. B. Lawes before the Royal Commission on market rights and tolls in 1889 corroborates this view. He says (*Q.* 6602) the prices of meat "are misleading in this sense. If I weigh a quantity of animals alive I can tell with very great accuracy, if they are my own breeding and feeding, what they will weigh dead. If I send to the London market and look at the quoted prices for that meat in the paper, I find that instead of my animals weighing when killed 55, 56, or 58 per cent., as I know they ought to weigh, they only weigh perhaps 50 or 51 per cent. I know with absolute certainty that the figures are misleading and incorrect."

It should be explained that the percentages here mentioned appertain to the dressed carcasses, or meat out of the whole live animal, the balance of percentages belonging to the offal. As additional testimony we have that of Mr. Westley Richards before the same Commission. He says (*Q.* 6548) as to newspaper quotations, "I am quite certain they are not reliable. I

have tested them," and he puts in the following table in proof of his opinion:—

TABLE A.—*Average Weights of Heifers sold to Butcher to Kill and Weigh.*

(August and September 1887.)

Description of beast	Live-weight on farm	Less 5% off farm weight	Weight at market	Offal	Car-cass	Estimated weight 14 lbs. stone	Weights given by butcher 14 lbs. stone	Percentage calculated on carcass-weights given by butcher	
								Offal	Carcass
	lbs.	lbs.	lbs.	lbs. 42%	lbs. 58%	st. lbs.	st. lbs.	%	%
3 Welsh heifers . . .	1,273	63	1,210	508	702	50 2	47 6	45·12	54·88
6 Irish maiden heifers	1,166	58	1,108	465	643	45 13	42 11	45·86	54·14
10 Cross-bred polled heifers	1,251	62½	1,188½	475	713½	51 0	47 9	43·85	56·15
8 Irish maiden heifers	1,210¾	60¾	1,150	483	667	47 9	44 6	45·73	54·27
Average of the 4 lots	—	—	—	—	—	48 9	45 8	—	54·86

Average percentage, calculated on estimated carcass-weight, 58·00 per cent.

Thus the carcass-weights given by the butcher are 3 stone of 14 lbs. against the farmer, and the estimated weight is about 1 stone under the actual weight.

Mr. Westley Richards, having laid the carcass-weight of his animals at 58 per cent. of the whole live animals, was not satisfied with the percentage of 54·86 given by the butcher's return of weights. To put the accuracy of his own estimate to the proof, he had sixteen fellow beasts slaughtered at Ashwell and weighed, with the result given in Table B.

TABLE B.—*Average Weights of 16 Beasts killed at Ashwell and Carcasses sent to Butcher.*

(November and December 1887.)

Description of beasts	Live-weight on farm	Less 5 % off farm weight	Weight at market	Offal	Car-cass	Estimated weight 14 lbs. stone	Actual weight 14 lbs. stone	Percentage of carcass calculated from the actual weight	
								Offal	Carcass
	lbs.	lbs.	lbs.	42 %	58 %	st. lbs.	st. lbs.	%	%
9 Irish maiden heifers	1,210	67½	1,142½	480	662½	47 4	48 5½	40·63	59·37
5 Black-polled Scotch oxen	1,280	66½	1,214	486	728	52 0	52 13	38·73	61·27
2 Cross-bred polled oxen	1,393	84½	1,308½	523½	785	56 1	57 3½		
Average of 3 lots .	—	—	—	—	—	51 11	52 12	—	—

It will be seen that the estimated weight is about 1 stone (14 lbs.) under the actual weight, when the carcasses were weighed at Ashwell. But when the weight of the carcasses was given by the butcher, it was 3 stones per beast less than the estimated weights (see Table A). If to this be added the 1 stone the weight was under-estimated before the animals were sold, a loss to the farmer is shown of 4 stones (of 14 lbs.) on each beast.

The result of Mr. Westley Richards killing and weighing was, he tells the Royal Commission (Q. 6560-1), that he got about five per cent. more weight of carcass, and proof that if the butcher had quoted a certain price per stone as paid by him, on Mr. W. Richards's weights, it would have been a gross over-statement side by side with the actual price he gave.

Mr. Westley Richards next showed the Commission the result of weighing at home a maiden heifer previous to its sale by auction at Oakham. In this case there was a difference of nearly 8*d.* per stone, or one penny per pound, between the market quotations price and that actually realised—equivalent to three pounds sterling on the value of the whole beast.

Mr. Westley Richards then, in corroboration of his own experience, puts in at Q. 6564 further evidence, from which Table C has been constructed.

From this table it appears there were twelve animals sold in April when the market quotations were 4*s.* 8*d.* per stone of 8 lbs., but assuming the percentage of carcass meat to be 58, they realised on the first occasion only 4*s.* 2½*d.* per stone of 8 lbs. for the carcass, or only 4*s.* 3*d.* per stone of 14 lbs. live-weight.

The same table shows that on May 7 three Shorthorns, not good enough to go with the others, were sold to a butcher by live-weight, at 4*s.* 8*d.* per live stone of 14 lbs.—making more than the others per head.

Then (Q. 6577) Mr. Westley Richards puts in Table D to show that in the case of twenty-one polled 'Scots either the market quotation or the butcher's estimate was wide of the fact. Taking counsel with the machine the weight of the carcasses came to 2,270 stones of 8 lbs. The market quotation was 4*s.* 10*d.*, but as the beasts made only 462*l.*, or an average of 22*l.* each, they must have gone at 4*s.* 3½*d.* per stone.

Although Mr. Westley Richards has been able to demonstrate by his inquiries and experiments how little reliance can be placed in the present market quotations, and what annoyance and feeling of distrust they give rise to whenever experience in weighing live cattle discloses the real approximate weight of the carcasses of the animals sent to market, there are signs that this incomplete evidence is not to last for ever, but is giving way, as day by day the opportunities it affords for imposture, and the fallibility of those who pretend to be infallible, are

TABLE C. — *Weights and Prices of 48 Beasts, fed and weighed alive by Lord Lucan at Laleham, and sold at Islington Market.*

The beasts, all four years old, had been fed in loose boxes for 22 weeks, getting 8 to 10 lbs. of cake per day, and were quite fat and ripe. They would probably yield 60 per cent. carcass.

Date	Description of beasts	Weight of each lot				Market quota- tion of the day per 8 lbs. stone	Estimated value of each lot; carcasses at 4s. 8d. per stone of 8 lbs.	Price realised				Real value per live stone at market quotation of 14 lbs.	Percentage of carcass						
		Alive at market 14 lbs. stone		Carcass estimated at 58 % of live weight 8 lbs. stone				Per lot	Per 8 lbs. stone	Per live stone 14 lbs.	Esti- mated		As sold at market						
		st.	lbs.	st.	lbs.														
1888 April 23	5 Shorthorns . . .	516	0	523	6	470	0	£	s.	d.	£	s.	d.	s.	d.	58°	52°05		
April 30	7 Shorthorns . . .	710	0	720	5	660	0	122	4	2	109	13	0	4	2½	4	3	58°	53°12
May 7	33 Shorthorns . . .	3,408	0	3,459	0	3,112	0	168	2	11	154	0	0	4	3¼	4	4	58°	52°18
May 7	3 Shorthorns ¹ . . .	290	0	294	3	290	0	807	2	7	726	0	0	4	2½	—	—	58°	57°14

¹ These beasts were sold by live-weight at 4s. 8d. per live stone by agreement; they averaged 3 stone less alive than the others, and yet made more money.

TABLE D.—Weights of 21 Polled Scotch Cattle fed by Lord Lucan, who weighed them alive at Laleham, and afterwards sold them at Market.

These beasts were the same age and feeding as those in Table C, but would yield probably 63 % of carcass.

—	Weight at market 14 lbs. stone	Esti- mated weight of carcass 60% 8 lbs. stone	Price per stone 8 lbs.	Estimated value	Sold for	Price per live stone	Per- centage of car- cass
Actual weight and price . . .	2162·0	2270·1	s. d. 4 0 $\frac{3}{4}$	£ s. d. —	£ s. d. 462 0 0	s. d. 4 3 $\frac{1}{4}$	60·0
Price at market quotation for Scots (4s. 10d.)	—	—	4 10	548 12 3	—	5 1	—
Butcher's esti- mate	—	1912·0	4 10	—	462 0 0	—	50·54

brought to light. Very competent judges of cattle admit that in guessing the weight of single animals their judgment does not go for much. It goes for more, undoubtedly, than the opinion of an incompetent person, but that is all, and experience has taught them that their guessing, to approach accuracy, must be made on a lot of beasts where a multitude of variations correct each other. A perception of the grave injury to trade connected with any general practice of guessing at weights has got abroad, and already the conductors of the *Times* newspaper recognise it, and furnish the world weekly with a record of sales by actual weight in the London market and the prices obtained per stone of live-weight. The animals being classified under descriptive notices, a guide is at once furnished to those who are provided with weighbridges at home to the current value of their fat stock. The accompanying "live-weight quotations" are taken from the *Times* of November 4, 1889, and are similar to those which that newspaper has printed weekly for some months past. They appeared under the heading of "Metropolitan Meat Market: Islington, Monday, Nov. 4."

If further illustration of the change of feeling and practice is required, it is furnished in the accompanying copies of sale notes, beginning with that of the ordinary bald description as posted to the cattle-feeder after market in London.

The marginal note respecting the state of trade is a sort of *obiter dictum*, in deference to which any opinion the seller might have formed of the weight and value of his four beasts is to be surrendered. He has no opportunity here of correcting it, for

LIVE-WEIGHT QUOTATIONS.

The following quotations are based on actual sales made at this market to-day, several of the beasts and sheep being weighed previous to sale, others after being sold. The quotations are at per imperial stone (14 lbs.). Several cases of sales by live-weight occurred.

No.	Description	Live-weight in imperial stones (14 lbs.)	Live-weight rate per imperial stone (14 lbs.)	Remarks
Beasts				s. d.
5	Polled Scotch .	497	4 10	{ Good second quality, grazed in Lincolnshire
3	" " "	267	4 10	{ Good second quality, grazed in Lincolnshire
3	" " "	248	5 0 $\frac{3}{4}$	Good second quality
1	" " " cow	82	4 9	" " "
6	Runts	609	4 8 $\frac{3}{4}$	" " "
2	" " " " "	220	4 9	" " "
3	" " " " "	239	4 9	" " "
1	" " " " "	74	4 8 $\frac{1}{2}$	" " "
6	" " " " "	575	4 9 $\frac{1}{2}$	" " "
5	" " " " "	483	4 5 $\frac{1}{2}$	Second quality, half-meaty
8	Herefords . .	770	5 2 $\frac{1}{2}$	Prime quality
5	" " " " "	461	5 2	" " "
2	" " " " "	181	4 4 $\frac{1}{2}$	Second quality, sold by live-weight
3	Devons . . .	291	4 6	Good quality, sold by live-weight
2	" " " " "	182	4 10	Good quality
3	Herefords . .	309	4 11 $\frac{1}{2}$	Prime quality, but not the best
2	Shorthorns . .	239	4 6 $\frac{1}{4}$	Second quality
1	" " Irish	114	4 5 $\frac{1}{2}$	" " "
6	" " " " "	622	4 7	" " "
2	" " Irish	196	4 7	" " "
1	" " " " "	99	4 6 $\frac{1}{2}$	" " "
2	" " " " "	192	4 4 $\frac{1}{2}$	Second quality, sold by live-weight
2	Cows	148	3 5 $\frac{1}{4}$	Inferior
1	Hereford Bull	108	3 11 $\frac{1}{4}$	Meaty and fat
1	Shorthorns . .	106	4 4 $\frac{1}{4}$	Good second quality
1	" " " " "	95	4 3 $\frac{1}{4}$	Second quality
1	" " " " "	96	4 4 $\frac{1}{2}$	Good second quality
1	" " " " "	88	4 3 $\frac{1}{4}$	Second quality
1	" " " " "	95	3 10	" " "
1	" " " " "	91	4 2 $\frac{3}{4}$	" " "
2	Runts	174	3 11	" " "
2	" " " " "	170	3 6	Second quality, half-meaty
2	" " " " "	162	4 2 $\frac{1}{4}$	Second quality
2	" " " " "	176	3 10 $\frac{1}{2}$	Second quality, half-meaty
2	" " " " "	177	3 8	" " " " "
2	" " " " "	198	3 11 $\frac{1}{2}$	" " " " "
3	" " " " "	270	4 1 $\frac{1}{4}$	Second quality
2	Polled Scotch .	175	4 2 $\frac{3}{4}$	{ Second quality, grazed in Lincolnshire
1	" " " " "	83	4 4	{ Second quality, grazed in Lincolnshire
1	" " " " "	82	4 3 $\frac{1}{4}$	{
Sheep				
6	Half-breds . .	56	5 10	Good quality
20	Downs	172	6 0 $\frac{1}{2}$	Prime
11	Half-breds . .	114	6 1 $\frac{1}{4}$	"
15	" " " " "	154	5 10	Good seconds, sold by live-weight
9	" " " " "	62	6 4	" " " " "
5	Downs	45	6 1 $\frac{1}{2}$	Prime
10	Dutch	90	5 4	Second quality
15	" " " " "	164	5 3 $\frac{1}{4}$	" "

NOTE.—The imperial stone of 14 lbs. live-weight may be taken in an average-fed animal as representing 8 $\frac{1}{2}$ lbs. of carcass or dead-weight. Prime animals would give a larger percentage of carcass-weight, perhaps as high as nearly 9 lbs. in very choice beasts, and inferior animals a less proportion.

Direct to me at London.

Date, Oct. 28, 1889.

4 beasts of Mr. Jones.

Sheep—

	£	s.
Mr. Brown	74	0
Selling charges	2	8
Bank	71	12

Trade very bad for all
but best quality.

R. TURNOVER & SON.

the actual and real value of "best quality" per stone cannot be given by the salesman, and certainly will not be disclosed by any butcher who has his wits about him.

The following is a copy of a Scotch sale note, the names only of the seller and buyers being changed. In other respects it is identical with the original as furnished by Messrs. Swan to their consignor:—

THE LIVE STOCK MART, HAYMARKET.

EDINBURGH..... 1888

Sold for James Burns, Esq., Muirton Mains.

By JOHN SWAN & SONS,

LIVE STOCK AGENTS,

47 LAURISTON PLACE,

EDINBURGH.

Live Wt. 8 Cattle..... Sheep..... Lambs..... Calves..... Pigs

cwts. qrs. lbs.	No.		£	s.	d.	£	s.	d.
23 3 0	2	Steers, Nos. 1. 2. D. W. Johnson	23	0	0	46	0	0
23 1 0	2	" " 3. 4. Tomson, Leith	22	5	0	44	10	0
23 3 0	2	" " 5. 6. Wallace . .	22	10	0	45	0	0
24 0 0	2	" " 7. 8. Bruce . . .	22	15	0	45	10	0
	8					£ 181	0	0
		<i>Galloways.</i>						
		Burns' Average per cwt.						
		38s. 2½d.						
		14 lbs. 4s. 9½d. live-weight.						
		<i>Commission</i>	2	5	3			
		<i>Keep</i>	0	8	0			
		<i>Freight</i>	0	0	0			
		<i>Trucks</i>	4	0	0			
		<i>Custom and Men . . .</i>	0	6	0			
		<i>Cheque</i>	174	0	9	181	0	0
			£ 181	0	0			

It is hardly conceivable that there should be such an extraordinary difference in the method of conducting precisely the same piece of business in London and in Edinburgh.

But between these two great metropolitan markets there is evidence of the new system coming into use, as is shown in the next copy of a country sale note.

.....Cattle Market, 18

Stock Sold for Mr.....

By H. T. HINCKS & LYALL,

AUCTIONEERS, VALUERS, AND LAND AGENTS.

HEAD OFFICES:—THE "MART," LEICESTER.

	£	s.	d.	Lot.	Purchaser.	Live-weight		£	s.	d.
						Imp. Stones	lbs.			
Tolls										
Lairage and Fodder .										
Rail Charges.										
Expenses . .										
Commission .										
Contra a/c .										
Cheque to balance .										

The new practice, it will be seen, being adopted by salesmen, will in the course of time become fairly established or disappear. As markets are furnished with machines under Mr. Richards's Weighbridge Act (52 & 53 Vict. c. 30), one great obstacle to reform is removed. Still, if the feeders of cattle are indifferent about, or hostile to, any change, progress will be slow in England.

It will not be out of place to introduce here some public information bearing on this point.

To begin with England. In the month of May this year the advantage of selling cattle by live-weight was the subject for discussion at the Farmers' Club in London, when a paper prepared by Mr. Westley Richards was read to the members, and the usual discussion followed. In the course of this discussion it became apparent that opinions differed among men of high reputation in the agricultural world, and one whose judgment and position in business entitled him to the highest respect boldly stated that he came to a different conclusion from the majority of the gentlemen present.

He proceeded on the spot to give his reasons for non-agreement, among others that there are so many subtle influences affecting the proportion of offal that the case is not quite as an advocate of weighing supposes. The speaker supported his arguments by quoting the results of a sale by auction at which the weights were declared. His reply to Mr. Westley Richards, if not complete and convincing, was a fair and reasonable one.

But discussion and conflict of opinion did not stop here. It so happened that the experiments conducted by the Royal Agricultural Society of England at Woburn furnished an opportunity of great practical value at that time for forming a comparison between the judgment of five experienced feeders of cattle and the statical authority of the scales. Dr. Voelcker, having charge of the feeding experiments at Woburn, invited these five gentlemen to estimate the carcass-weight of eight of the experimental beasts he was about to weigh. It should not be forgotten that the amount and character of the food consumed, the period of fattening, and the treatment of these animals down to the nicest details were furnished to the guessers. There seems to have been nothing wanting to render the guesses oracular except the gift of divination. That this certainly was not vouchsafed will be gathered from Table E on p. 463.

Furthermore, in Scotland an experiment of precisely the same nature has been conducted under the supervision of Mr. McJannet of Woodlands Stirling, a convert to the weighing-machine. On February 5, 1889, after exhibiting four of his animals to his invited friends, he informed them of how they had been summered and wintered in Midlothian, the method of feeding, and the allowance and nature of the food given. He then asked the company to imagine themselves in an auction mart, and after each bullock was driven round and handled by them, he said he would be glad if his practical and experienced friends would declare on slips of paper the prices they would bring in the sale ring. Nine out of about thirty entered the lists against the machine on the weights of which Mr. McJannet computed his own estimates.

The four oxen afterwards went to Messrs. Swan of Edinburgh, where the live-weights were announced in the usual way, and they were sold by auction with the result shown in Table F on p. 464.

Justice in the Court-house is depicted with a bandage over her eyes and just scales in her hand. The lesson thus taught is not to trust to conjecture and supposition when the balance is at hand to reveal facts, and by facts, without partiality or favour, to come to a decision. The quidnuncs of the cattle-market have no objection to open eyes, but regard the scales as out of place,

TABLE E.—Woburn Feeding Experiments, 1888 and 1889.
Farmers' Estimated Weight compared with Actual Weight.

Bullock	Farmer	Farmer's estimated carcass-weight in 8lb. stones		Actual weight in 8lb. stones		Difference, 8lb. stones	
		st.	lbs.	st.	lbs.	st.	lbs.
No. 1	A.	99	6	106	6	7	0 under
	B.	96	0	"	"	10	6 "
	C.	98	0	"	"	8	6 "
	D.	92	4	"	"	14	2 "
	E.	104	0	"	"	2	6 "
No. 2	A.	101	4	104	6	3	2 under
	B.	100	0	"	"	4	6 "
	C.	101	4	"	"	3	2 "
	D.	95	0	"	"	9	6 "
	E.	110	0	"	"	5	2 over
No. 3	A.	98	0	103	7	5	7 under
	B.	98	0	"	"	5	7 "
	C.	98	0	"	"	5	7 "
	D.	95	0	"	"	3	7 "
	E.	105	0	"	"	1	1 over
No. 4	A.	95	3	93	7	1	4 over
	B.	94	0	"	"	0	1 "
	C.	91	0	"	"	2	7 under
	D.	87	4	"	"	6	3 "
	E.	98	0	"	"	4	1 over
No. 5	A.	98	0	93	0	5	0 over
	B.	95	0	"	"	2	0 "
	C.	99	6	"	"	6	6 "
	D.	92	4	"	"	0	4 under
	E.	96	0	"	"	3	0 over
No. 6	A.	100	5	102	0	1	3 under
	B.	100	0	"	"	2	0 "
	C.	96	2	"	"	5	6 "
	D.	95	0	"	"	7	0 "
	E.	107	0	"	"	5	0 over
No. 7	A.	92	6	98	1	5	3 under
	B.	90	0	"	"	8	1 "
	C.	89	2	"	"	8	7 "
	D.	87	4	"	"	10	5 "
	E.	88	0	"	"	10	1 "
No. 8	A.	98	0	105	2	7	2 under
	B.	97	0	"	"	8	2 "
	C.	98	0	"	"	7	2 "
	D.	95	0	"	"	10	2 "
	E.	96	0	"	"	9	2 "

Of 40 estimates, 30 were under and 10 over the actual weights.

Difference between Farmers' Highest and Lowest Estimates in 8lb. Stones.

Bullock . . .	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Highest . . .	st. lbs. 104 0	st. lbs. 110 0	st. lbs. 105 0	st. lbs. 98 0	st. lbs. 99 6	st. lbs. 107 0	st. lbs. 92 6	st. lbs. 98 0
Lowest . . .	92 4	95 0	95 0	87 4	92 4	95 0	87 4	95 0
Difference. . .	11 4	15 0	10 0	10 4	7 2	12 0	5 2	3 0

TABLE F.—*Mr. McJannet's Experiments to test Farmers' Valuation of Cattle, February 7, 1889, against Mr. McJannet's own Valuation based on Live-weight.*

Bullock	No. 1	No. 2	No. 3	No. 4	Total estimated value of 4 bullocks
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1st Farmer's estimate	19 0 0	17 0 0	17 0 0	17 0 0	70 10 0
2nd " "	18 0 0	17 0 0	17 6 0	16 0 0	70 10 0
3rd " "	18 10 0	17 15 0	17 0 0	17 10 0	70 15 0
4th " "	18 0 0	19 0 0	17 10 0	17 10 0	72 0 0
5th " "	19 0 0	18 10 0	18 0 0	18 0 0	73 0 0
6th " "	19 10 0	19 10 0	19 0 0	19 0 0	76 10 0
7th " "	21 10 0	19 10 0	18 10 0	18 10 0	77 0 0
8th " "	21 10 0	19 0 0	18 0 0	18 0 0	77 0 0
9th " "	21 0 0	20 0 0	19 10 0	19 10 0	79 0 0
Highest . . .	21 10 0	20 0 0	19 10 0	19 10 0	79 0 0
Lowest . . .	18 0 0	17 0 0	17 0 0	16 0 0	70 10 0
Difference	3 10 0	3 0 0	2 10 0	3 10 0	8 10 0
Price the four beasts realised at auction					81 7 6
Mr. McJannet's valuation, based on live-weight					81 6 9
Difference					0 0 9

Mr. McJannet's own separate Valuation.

Bullock	No. 1	No. 2	No. 3	No. 4	Total
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
—	21 5 3	21 0 9	20 2 9	18 18 0	81 6 9

Or 9d. less than price realised.

A second test of the same kind was made on March 2, 1889, when eleven farmers undertook to estimate the value of four more fat oxen in the same manner, Mr. McJannet after weighing putting down his own estimate on a slip of paper as before. The result is shown in Table G, page 465.

A neighbour in the Midlands, who is a breeder of quite first-class Herefords, has for some time made use of a machine he put down at the farm premises. He says the use of it has been most instructive in ascertaining, without any shadow of doubt, the progress his animals make in feeding, and in enabling him to fix a reserve which he can stand by when they are put up to auction. For instance: three cows from grass in good condition, about three parts fat, were put up in the yards on December 17 to "finish off," with the following results. No. 1 went in weighing 12 cwt. 1 qr. 14 lbs.; on January 9,

TABLE G.—*Mr. McJannet's Second Experiment to test the Accuracy of Farmers' Valuation of Cattle, March 2, 1889, against Mr. McJannet's own Valuation based on Live-weight.*

Bullock	No. 1			No. 2			No. 3			No. 4			Total estimated value of 4 bullocks		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1st Farmer's estimate	17	10	0	16	10	0	16	3	0	15	0	0	65	3	0
2nd " "	18	0	0	17	0	0	17	10	0	16	10	0	69	0	0
3rd " "	18	0	0	16	16	0	17	8	0	16	16	0	69	0	0
4th " "	17	15	0	17	10	0	17	15	0	16	10	0	69	10	0
5th " "	18	10	0	18	0	0	17	10	0	17	10	0	71	0	0
6th " "	19	0	0	18	0	0	17	10	0	18	10	0	73	0	0
7th " "	19	0	0	19	10	0	19	0	0	19	0	0	76	10	0
8th " "	20	0	0	21	0	0	20	0	0	20	0	0	81	0	0
9th " "	21	0	0	22	0	0	22	0	0	22	0	0	87	0	0
10th " "	18	18	0	18	0	0	18	0	0	17	15	0	72	13	0
11th " "	19	10	0	18	15	0	19	10	0	18	0	0	75	15	0
<hr/>															
Highest . . .	21	0	0	22	0	0	22	0	0	22	0	0	87	0	0
Lowest . . .	17	10	0	16	10	0	16	3	0	15	0	0	65	3	0
<hr/>															
Difference	3	10	0	5	10	0	5	17	0	7	0	0	21	17	0
<hr/>															
Price the four beasts realised at auction													73	15	0
Mr. McJannet's valuation of them based on live-weight													73	10	0
<hr/>															
Difference.													0	5	0

Mr. McJannet's own separate Valuation.

Bullock	No. 1			No. 2			No. 3			No. 4			Total		
—	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
	18	15	0	18	15	0	18	3	9	17	16	3	73	10	0

Or 5s. less than price realised.

she weighed only $12\frac{3}{4}$ cwt. No. 2, with same dates, began at 12 cwt., and attained only to 12 cwt. 20 lbs. No. 3 went in at 13 cwt., and reached only 13 cwt. 1 qr. Without the scales, hope and the steward might have told a flattering tale; but with them the verdict was certain, "something wrong." Since this result, if animals do not increase, he says, the food is immediately changed. In marketing these Herefords, the dead-weight of 8 lbs. per stone is arrived at by first deducting 5 per cent. off the live-weight, and then taking 57 per cent. of live-weight as representing the carcass. This has been proved in the slaughter-house to be a fair computation.

We may pass on now from the experience and teaching of those who have consulted the scales in marketing fat stock, to a

consideration of the advantage derived from their use in dealing with store stock.

It would appear that quite as good service is rendered by them in this business, if not better. There is really less left to conjecture in trading store animals than fat ones. The indications of age are certain, the condition is obvious, and the health of the animal is known from his coat and his general carriage. If the former be loose and flexible, and the latter gay and lively; if the eye be clear and full, the muzzle moist, the horn kind, the head not sour or snubby, no symptoms of scouring, and none of having been "too well done," he will pass muster. If the character of the breeder's herd is established, the bulls he uses of good repute and blood, and the value per stone of similar stores can be quoted, a fair bargain can be struck by weight in a few minutes. The purchased animals can remain in their winter quarters till the grass is up, and then be weighed out and paid for.

At the same meeting of the Farmers' Club in London to which reference has been made, Mr. Fisher, of Dingley, near Market Harborough, was present. He has had some experience in buying stores by live-weight, and stated that in 1886 he purchased 91 stores (61 bullocks and 30 heifers) by live-weight in Ireland. He had never seen the animals before the purchase in 1886 was completed. The quality and breed of the herd were known to him to be very good. The transaction was a satisfactory one. In 1887 he purchased 91 bullocks again by live-weight, and in 1889, 85 in the same way. The fact that a large grazier was able to purchase in three years from the same owner that quantity of store-stock by live-weight, proves conclusively that the system of buying and selling stores by live-weight is mutually beneficial to buyer and seller. These stores were bred in Ireland. In 1886 and 1887 Mr. Fisher gave 3s. 8d. per live-stone in Ireland, and paid the carriage. In 1889 he had to give 4s. It was on April 29 when Mr. Fisher made this statement, and the grass in the Midlands was hardly fit. Such stores as these were better off the pastures than on them; so though they were bought in the beginning of the month, they had not been delivered on the 29th.

In 1886 he bought the ninety-one store animals in March, but did not take them till May 1, when they were weighed in to him. He was comfortably situated, inasmuch as during the intervening month he had not to go about from market to market and from fair to fair, searching for what he wanted. In 1887 he purchased from the same owner and the same farm as he had done in 1886, so that he knew perfectly well what class of animal he was buying.

In 1888 Mr. Fisher had to go to fairs and markets to stock his pastures, and bought by the "hand and eye," but the stock went on the scales at home. There were several lots. The lowest price at which he had bought turned out to be 2s. 6d. and the highest 4s. 8d. per stone of 14 lbs. live-weight, and he states that, although he considered himself a practical man, he paid 4s. 8d. a stone for no better quality than that for which he paid 2s. 6d. All the lots seem to have been bought within a month.

A reference to the next Table, H, giving the actual weights after purchase of eighty-five animals by eight different buyers on the same day at a great Midland fair, together with the prices paid for them, corroborates Mr. Fisher's conclusions as to the mistakes traders make in trusting to "hand and eye" alone.

Table H.—Weights and Cost of 85 Beasts bought at a Fair on one day in May 1889.

Lot	Description	Number bought	Average live-weight	Cost per head	Cost per stone of 14 lbs. live-weight
			st. lbs.	£ s. d.	s. d.
1	2-year-old bullocks, never lost calves-flesh, fat. Would dress 57 per cent. and 58 per cent. (baby beef). Shorthorns of extra good quality	5	81 4	22 0 0	5 5
2	2½-year-old Shorthorn heifers, store condition	2	57 12	14 10 0	5 0½
3	Black Polled Angus, bred in Ireland, 2½ years old, very poor	9	51 0	12 10 0	4 10¾
4	Black Polled, bred in Ireland, very poor, full 6 months younger than lot above . .	23	45 7	13 10 0	5 11¼
5	Shorthorn bullocks, fair quality Irish, store condition . .	23	81 1	20 0 0	4 11½
6	Shorthorns, second quality, 2 years old, Irish	16	59 3	16 0 0	5 5
7	Shorthorns, 3 years old, good quality, fresh store condition	4	81 10	19 15 0	4 10
8	Kerry heifers, poor quality, grazed near Leicester . .	3	35 8	7 10 0	4 2¾

Stores were making a high price at this fair, as indeed they were everywhere else; but that is no reason why a given weight of inferior store animals should make considerably more than that of a better lot of the same breed.

The age, breed, and condition being known, this could not

have happened if the animal had gone on the scales before instead of after the purchase.

Before proceeding to give an account of the use of the weighbridge in Scotland at the present day in the disposal of large numbers of cattle of different breeds, notice must be taken of very recent public evidence of a deviation from the old method of conducting sales in the London market, as appears from the subjoined sale note issued by one of the most important salesmen at Islington. It records an actual transaction at that market on October 14 this year, and is, with the exception of the name of the consignor and buyer, a literal copy.

Cattle weighed and the weight returned on the Sale Note when required.

Direct to us at

MESSRS. LACY, HARTLAND, WOODRIDGE & Co.

60 WEST SMITHFIELD, LONDON.

Beasts sold for Mr. Feeder, October 14th, 1889.

Live-weight							£	s.	d.
Imperial Stones Lbs.	No.			£	s.				
323 7	4	Prover	4/8	75	11/5	Commission . .		16	
						Bankers' charges and Market expenses . .		6	8
						Hay & Layerage		8	
						Drover		2	
						Railway Freight	1	1	4
						Steam Boat . .			
						Trucking . . .			
						Telegram . . .			
						To	2	14	
							72	17	5
			£				£		

Your obedient servants,

HENRY HICKS & SON,

Cattle Salesmen.

Supposing these four beasts to have dressed out 57 per cent. of carcass to the live-weight, their meat made just about 7d. the pound. The percentage of carcass to the whole animal is well known to those who are in the habit of using the machine, and with this knowledge at their command such a sale note as that now in use by Messrs. Hicks & Son clears away, if any exist, the grounds for doubt and question which obviously may be expected to accompany imperfect information.

While introducing this example of a modern sale note, no suggestion is intended that other London salesmen are not adopting a similar form. In fact, Messrs. Hincks & Lyall, at the Metropolitan Market, give the same information. To return again to Scotch practice on a large scale. It seems advisable not to let the opportunity go by of giving an account of Messrs. Swan & Sons' great November auction of stores this year at the Haymarket, Edinburgh, on Monday, November 11, in continuation of a similar sale on November 12 last year, when 2,736 cattle were on show. Messrs. Swan then furnished some intelligence as to weights and prices of animals, taken at random at their auction, with the names of the graziers and the purchasers, with weights, prices per head, per cwt., and per stone; but the fact of taking these animals out at random, without reference to age, breed, or condition, lessened the value of the information for statistical purposes, though it was instructive as far as it went, and as a witness of the extended use of the scales at that date.

This year, however, Messrs. Swan have suggested the adoption of method in tabulating values and weights of the different breeds and ages of animals consigned to them for disposal, a proof of their readiness to assist inquiry by a systematised statement of facts, and making an account of their sales more generally instructive.

The market or show-yard in the Haymarket adjoins the rails of the North British Railway at their Haymarket Station, and consists of two large covered sheds with span roofs and free communication between them. The cattle are admitted from the railway trucks and wharf through sliding doors at one end, and are passed down the gangways into lateral pens. One of these large sheds—one half, indeed, of the market—is provided at the far end with a large pen, the bottom of which is the platform of a Pooley's weighing-machine. This platform will carry and balance eight full-sized beasts, and of course more younger cattle. A large side-gate on it gives the cattle access to the ring, or rather semicircle, in which the auction takes place. Side by side with this gate from the weighbridge is another, opening into one of the main gangways of this shed, by which the cattle pass back and out after having been offered for sale. On an elevated stand *inside* the ring and immediately adjoining the machine, which itself is outside the ring, a clerk is stationed, having the beam of the machine under his eye and hand. An opening in the wall enables him to communicate directly with the drovers as they pen the cattle on the platform. He thus obtains the numbers. On a slate tablet on the wall

above his head he enters this number, and below it the weight of the cattle.

This is in full view of the auctioneer and of the company. As soon as one batch has passed off, and while they are being offered, he sponges out the figures, and takes the numbers and weight of the next batch. These he chalks up as soon as the previous batch are put out of the ring. Some of the vendors do not submit their cattle or portions of their cattle to the test of the scales. In this case their animals enter the ring from the other shed, which is not provided with the scales. The youngest cattle are the stock that more than others escape the ordeal. On the wall over the exit from the machine, and in full view of the company, is this notice:—

Henry Pooley & Son.

No. 6745. This is to certify that we have this day completed our quarterly examination repair, test, and adjustment of your cattle-weighing machine at your yard, and have left it in good working order.

For H. Pooley & Son, JAMES HIND.

To Messrs. J. Swan, Haymarket, Edinburgh:

July 22, 1889.

The auctioneer makes no remarks about the weights, but the buyers do so, and in some instances act promptly on a hint given by a friend or bystander who owns and uses a machine on his farm.

The stores offered on November 11 were about 1,600 in number, coming from Meath, Sligo, Mayo, Kerry, Cumberland, Westmoreland, Yorkshire, the Highlands, and Midlothian. The ages ran from three years to six months old. The condition on the whole was good—specially so in the case of the Irish stock. Quality invariably brings the average per stone up, and when the first lots of each breed, with weights and prices made known, have been knocked down, the prices of the subsequent lots no longer remain a matter of conjecture after their weights are announced. For instance, ten two-year-old Irish stirks, weighing out $70\frac{2}{5}$ stone, made 14*l.* 15*s.* each, or over 4*s.* 2*d.* per stone; very fresh and good. The next lot, not quite so blooming, 73 stone each, went under 4*s.* 1*d.* per stone; the next, a shade less attractive, $67\frac{1}{2}$ stone, made 4*s.* These were all from the same grazing. Another vendor's Irish two-year-olds went: 72 stone, for 14*l.* 10*s.*, or 4*s.* a stone; 69 stone, 13*l.* 15*s.*, or 4*s.* per stone; another, $64\frac{1}{2}$, for 13*l.* 2*s.* 6*d.*, or 4*s.* 1*d.* per stone; while another, inferior, averaging 66 stone, made only 12*l.* 5*s.*, or 3*s.* 9*d.* per stone. Any lots of Irish stirks of good quality not reaching 3*s.* 11*d.* per stone were immediately withdrawn.

The Polled Irish of good quality, averaging $81\frac{1}{3}$ stone, made 16*l.* 2*s.* 6*d.*, or 4*s.* per stone; some up to 4*s.* 2*d.* There were some very pretty Kerry heifers, five in one lot, which weighed 1 ton $11\frac{1}{2}$ cwt., or $50\frac{1}{2}$ stone each. They sold at 9*l.* 7*s.* 6*d.*, and therefore made only 3*s.* 9*d.* per stone. There was no certainty as to their being barren.

The English steers and stirks, if of good quality and good condition, made 4*s.* per stone; with worse quality the price of the lot invariably declined, with the nicest adjustment to the weight. Condition did not appreciably affect the price per stone at this sale. While, however, the price for good Irish-bred stores agreed with that paid for English, the prices made the next day for fat Irish fell materially below that which the home-bred stock commanded. Coming next to Scotch cattle, of which there was no great display, one lot of Scotch Galloways, averaging $52\frac{1}{4}$ stone, made 10*l.* 10*s.* each, or just about 4*s.* per stone; while another lot of Galloways from Ireland, very thick beasts, made only 3*s.* 10*d.* These beasts, however, were brought back after the sale to be weighed; and possibly there may have been an error. Younger Galloway stirks, 46 stone weight, made 3*s.* 8*d.*

Messrs. Swan wired to Glasgow on Sunday evening for four trucks of Canadians to come up; they arrived during the sale. Two lots of ten each passed over the machine, averaging 63 stone per animal, and selling for 10*l.* 17*s.* 6*d.*, or a little under 3*s.* 6*d.* per stone. The other two lots were withdrawn.

The next day's sale, Tuesday, November 12, consisted of fat cattle, sheep, and a few pigs. Here there seems to be a more direct reference to the scales both by the auctioneers and the buyers—the auctioneer occasionally, to help on the bidding, calling on the weigh-clerk to announce the weight; and, on the other hand, the bystanders using a table or a book of reckoning for the reduction of quotations per head to price per stone, during the progress of the bidding.

Most of the animals would dress out 57 per cent. of carcass to the 100 lbs. live-weight. On this computation, the 14-lb. stone of live-weight yields just about 8 lbs. of dead meat, and the price of the live stone is the price of the dead stone. Where the animals were not ripe, down went the price per stone to 4*s.*, which was the lowest quotation; while, on the other hand, with some very prime home-bred steers fed in Ross, 5*s.* 3*d.* was reached; 5*s.* and 5*s.* 1*d.* were made with other cattle from the same district. They were all as good as could be desired; but Mr. Westley Richards has just made in London 5*s.* 6*d.* per stone live-weight of his Polled Cumberland cattle. The Irish, shipped from Ireland, though well fed, displayed some of the coarseness

that goes with heavy weights. They were the heaviest stock shown, running up to 104 stone live-weight, and averaging 4s. 3d. the live stone.

It is most interesting to observe the close agreement there is between the character of the stock and the testimony of the scales as to value, and it is impossible to avoid the conclusion that most of the special advantage enjoyed by "old hands" will be lost to them as the trade appeals to the scales. What seems generally to be wanting to make quotations of price and weight thoroughly instructive, is a clearer description of the animals to which the quotation refers. This appears now to be understood by the writer of the *Times* report of the Metropolitan Cattle Market, for on November 11 this year we have the following classification:—Scotch; 90-stone to 95-stone Herefords; ditto Runts; 100-stone ditto; 90-stone shorthorns; heavier ditto; Irish; Danish; Swedish. Further on this information is amplified by actual weights accompanying the quotation, to which attention has been directed in an earlier part of this article.

In conclusion, as it appears beyond question that weighing live cattle does materially assist in ascertaining their value, either in stores or fat beasts, it is most desirable that every facility for the practice should be afforded. It is too much to expect that the ordinary run of tenants should go to the expense of putting up machines on moderate-sized holdings. If an efficient movable machine could be constructed, it might prove serviceable and economical. It might be provided for the use of the tenants on an estate, or a private fixed machine might be put down near their railway station, where their stock are loaded or unloaded, or in some other convenient spot. It would probably soon come into general use; at first, perhaps, to satisfy curiosity, or decide a bet, and then to furnish information. In the absence of such local outlay, it is not to be expected that, except with large buyers or sellers, there will be any general private trade in store cattle by weight. Nor is it to the credit of rural economy in England that useful appliances for this end are to be met with so frequently in the New World, and so seldom in the mother country. They are as needful and useful in one land as the other, and certainly the ordinary inexperienced feeder or trader (and there are many such), who is deprived of their assistance, carries on his business at a great disadvantage; while, on the other hand, those who have the opportunity of applying such a test, either for rearing, feeding, buying, or selling, will in a short time find the instruction derived from the system of the utmost possible service, and its adoption most profitable.

XXVI.—*Report of the Senior Steward of Implements at Windsor.*
By S. P. FOSTER.

THE great Windsor Show—to which all connected with the Royal Agricultural Society were looking forward with so much anticipation—has come and gone, and has happily left none but pleasant memories behind it. The highest hopes of those responsible for its inception and organisation were more than realised in the unprecedented entries, the high quality of the exhibits, the brilliant summer weather, the gratifying attendance of the public, and last, but most important, the distinction conferred upon the Meeting by the personal interest and presence of Her Majesty the Queen and the other members of the Royal Family.

It falls annually to the lot of the Senior Steward of Implements to chronicle the leading features of the Show at which he makes his last official appearance; and it is not seldom a matter of difficulty for him to find the wherewithal for his brief chronicle of the times, the more elaborate papers of the official reporters and others leaving him little more to descant upon than the attendance of the public, the weather, and the hospitalities which the Society receives from the local authorities. This year, however, there is a more noble theme for the pen of the chronicler; and if I shall seem in what follows to tell a twice-told tale to those who had the good fortune to be present at Windsor, the facts may, I trust, not be without value in years to come, as a record of the circumstances in which the Society celebrated its Jubilee by the holding of a Show of unparalleled size and importance.

It is not necessary here to dilate upon the various incidents of the year which led up to the opening of the Show. The public meeting at the Mansion House on June 25, 1888, to promote the success of the exhibition by obtaining funds from the citizens of London for the augmentation of the prize-sheet and the defrayal of the unusually heavy expenses; the subsequent efforts of the Lord Mayor (now Sir James Whitehead, Bart.) and of Mr. Walter Gilbey (the Chairman of the Show Committee) in collecting the Mansion House Fund; the indefatigable labours of the Mayor of Windsor (Mr. G. H. Peters) in raising the local guarantee fund, and in meeting the requirements of the Society in other ways; Her Majesty's state banquet to the Council at St. James's Palace on March 26, to commemorate the fiftieth anniversary of the foundation of the Society; the Lord Mayor's banquet on the eve of the opening of the Show, and the Mayor of Windsor's luncheon to His Royal Highness

the Prince of Wales and representatives of the Society on the Wednesday of the Meeting—these were all notable events in connection with the Show which will doubtless be fully noticed in the History of the Society, but which hardly fall within the province of a Steward of the yard to describe at length. Undoubtedly they had each and all an important share in adding to the *éclat* of the Meeting, and to its success.

It was obvious from the first that the Windsor Show would be one of unusual size, but the final entries surpassed the most sanguine anticipations, and made the task of those responsible for the preparations a very arduous and anxious one. The fact that when the Show opened its gates all the arrangements had been made with the usual completeness, and that there was no hitch of any kind in the organisation throughout the week, is one upon which the Society may well be congratulated.

The number of implements entered at Windsor reached a total of 7,446, in 553 stands, the shedding for which comprised 15,602 feet, exclusive of open ground space. This number beats the record of all previous years, with the exceptions of Kilburn (1879), Oxford (1870), Manchester (1869), and Wolverhampton (1871). It must be borne in mind, however, that after the Wolverhampton Show the exhibition of duplicate entries was prohibited, which naturally made a great difference in the totals, so that practically, the Kilburn International Show alone excepted, the display of implements at Windsor was the largest and at the same time the most comprehensive that has ever been gathered together by the Society.

The Show has once before been held at Windsor—in 1851, the year of the Great Exhibition, when Her Majesty the Queen, the Prince Consort, the Prince of Wales, and other members of the Royal Family paid it a visit. But in that year there were no implements shown, the Society having foregone this part of its exhibition in favour of the “Crystal Palace” in Hyde Park. At the first London Show, held at Battersea in 1862, there were 342 stands and 5,064 articles catalogued. The following brief table gives the number of feet run of shedding (exclusive of open ground space) allotted at Kilburn in 1879, and Windsor in 1889, together with the mean of the seven years 1882–8:—

Description of shedding (exclusive of open ground space)	Windsor 1889	Average of 7 years 1882–8	Kilburn 1879
Ordinary	10,378	8,077	16,000
Machinery in motion	2,496	1,869	4,683
Special shedding (including seeds, models, &c.)	2,728	1,600	2,220
Total	15,602	11,546	22,903

Of the phenomenal entries of Live-Stock it is rather the province of my colleague, the Senior Steward of Live-Stock, than of myself to speak.

The site for the Show ground was remarkably eligible and picturesque. It was a large level part of Windsor Great Park, known as the Cavalry Exercise Ground, situated close to Queen Anne's Ride and not far from the famous Long Walk. The Show-yard was almost equidistant from Egham, Ascot, Slough, and Taplow railway stations, and the area included within the hoarding was no less than 127 acres. Some idea of the extent of the shedding *erected* may be gathered from the following figures showing the length occupied by the various sections:—

	Feet		Feet
Horses	8,912	Special shedding	2,728
Cattle	12,953	Farm produce	1,200
Sheep and pigs	6,010	Herdsmen's rooms	1,944
Implements	10,803	Miscellaneous	3,566
Machinery in motion	2,496		
Refreshments	1,634	Total	52,246

This made nearly ten miles of shedding, including the various offices and permanent buildings of the Society. Amongst the novel additions to the arrangements of the Show were the dormitory sheds for herdsmen, and the staff rooms for the accommodation of the assistant stewards and official staff. The plan on pages 484 and 485 gives a good idea of the fan-shaped arrangement of the sheds.

The Implement Yard and Dairy opened on Saturday, June 22, the weather being, as it had been for some days previously, brilliantly fine.

On Sunday, June 23, the customary service for herdsmen was held at noon in a tent in the Showyard; but an unusual interest was given to it this year by the attendance of their Royal Highnesses the Prince and Princess of Wales, the Prince and Princess Christian, with members of their families and households. The sermon was preached by the Very Rev. Randall Davidson, Dean of Windsor, from the text, "Thou makest him to have dominion over all Thy works." There was a very large attendance, nearly all those who had the privilege of access being present. After the service the Royal party partook of luncheon in the Royal Pavilion, and during the afternoon they walked round the stock sheds in order to make a leisurely and undisturbed inspection of the animals.

On Midsummer Day, June 24, the Show was fully opened, and the whole of the day was occupied with the judging of stock. On Tuesday, June 25, the fiftieth annual meeting of

Governors and Members was held in the large tent under the presidency of the Prince of Wales, and the whole proceedings were characterised by the utmost enthusiasm. His Royal Highness made an opening speech which made a great impression on all who heard it, and it is therefore recorded below :—

My Lords and Gentlemen : I take the chair with peculiar pleasure upon this occasion, firstly, because it is the fiftieth annual meeting held in the Society's Showyard, and secondly because we are gathered together, under the shadow of Her Majesty's own residence, and in her own park, to celebrate the opening of a Show of unparalleled magnitude and importance, held under Her Majesty's presidency. It will be a source of great gratification to Her Majesty to know that so large an assemblage is gathered here to-day ; and that so far everything has been a complete success. As you all will have seen, the Show is unequalled in the history of the Society, not only in its extent, but also in its comprehensiveness ; and I do not think I can do better, in bidding you a cordial welcome as Acting President of the Society, than quote the words of my lamented father at a similar gathering held here in the year of the Great Exhibition in 1851, when he said :—“ Your encampment singularly contrasts with that which the barons of England, the feudal lords of the land, with their retainers, erected around old Windsor Castle on a similar mead, though not exactly in the same locality. They came then clad in steel, with lance and war-horse. You appear in a more peaceful attire, and the animals you bring with you to the meeting are the tokens of your successful cultivation of the arts of peace. King John came trembling amongst his subjects, unwillingly compelled to sign that Great Charter which has ever since been your birthright. Your Sovereign comes confiding among her loyal and loving people ; she comes to admire the result of their industry, and to encourage them to persevere in their exertions.” These words apply with redoubled force and meaning at the present moment, and when Her Majesty visits the Show, as she hopes to do on Thursday, I am sure that she will be highly gratified to know that her year of office has been crowned with so magnificent a success.

Votes of thanks were unanimously accorded to the Mayor and Corporation of Windsor, to the Lord Mayor of London and the Mansion House Committee, and to the Windsor Local Committee for services rendered in connection with the Show.

The following resolution was then moved by the Duke of Richmond and Gordon, and passed by acclamation, the whole assemblage rising to their feet and giving ringing cheers :—

The Royal Agricultural Society of England, in general meeting assembled, desires, with every feeling of loyal attachment, to express to Her Majesty the Queen its grateful sense of the honour and benefit conferred by Her Majesty's gracious condescension in the acceptance, during its Jubilee year, of the position of President of the Society.

By this act Her Majesty has shown in the most direct manner the great interest which she feels in one of the most important industries in Her Majesty's dominions. This must be a great incentive to those engaged in agriculture to continue their efforts to meet the depression under which that industry has for so long been unhappily suffering.

The Society, at the close of Her Majesty's year of office, desires once more to assure Her Majesty that there is no class of her subjects more devotedly attached to Her Majesty than the agriculturists of England.

The Duke of Richmond presented to His Royal Highness at the same time the Gold Medals which had been specially struck by the Society for presentation to Her Majesty the Queen and the Prince of Wales in commemoration of the Society's Fiftieth Anniversary Exhibition. In acknowledging the resolution and the Medals on behalf of Her Majesty and himself, His Royal Highness said that he had little doubt that when he informed Her Majesty of what had occurred "it would deeply gratify the Queen."

On Wednesday, the Mayor of Windsor, Mr. G. H. Peters—to whom the warmest acknowledgments are due for his untiring efforts to promote the success of the Show—gave a luncheon at the Guildhall, Windsor, in honour of the Society. Among those present were their Royal Highnesses the Prince of Wales, Prince Christian, and Prince Henry of Battenberg, the Lord Mayor of London, and the Prussian Minister of Agriculture—his Excellency Baron Lucius von Ballhausen.

On Thursday, June 27, the Queen paid her first visit to the Show about 4 P.M. Her Majesty came in semi-state, and was received at the entrance by the Honorary Director (Mr. Jacob Wilson) and conducted to the handsomely-fitted Royal Box in the centre of the Grand Stand. In the carriage with the Queen were the Princess of Wales, Princess Christian, and Princess Beatrice, and on either side of it were the Prince of Wales and Prince Christian on horseback. In the other carriages were the Princesses Louise, Victoria, and Maud of Wales, the Princess Victoria of Prussia, the Princess of Leiningen, and ladies and gentlemen of the Court. Never has the Society's Showyard been the arena of a more imposing spectacle. Those who were privileged to witness it will not easily forget the scene as the carriages with their escort came slowly up the main avenue of the yard and reached the open space before the Queen's Pavilion, amid the incessant and enthusiastic cheers of the multitude; Her Majesty, who wore her gold badge of office as President, smiling and bowing in recognition of the welcome given her, whilst the band of the Grenadier Guards played the National Anthem. When Her Majesty had reached the Royal Box, the Council and officers of the Society were each in turn presented by the Prince of Wales. The prize horses were then paraded in the ring, after which Her Majesty presented to the respective winners the Gold Medals which she had offered for the best horses and the best cattle of the respective breeds. After this Her Majesty took tea in the Royal Pavilion and subsequently drove to the Working Dairy, where she presented a Gold Medal to the winner in the champion butter-making contest.

In the morning of Friday Her Majesty again visited the Show and inspected the prize cattle, sheep, and pigs, as well as several of the implement stands. On two subsequent occasions (the last time accompanied by Princess Louise and the Marquis of Lorne) the Queen drove into the Showyard, and appeared to be very greatly interested in its various departments.

Throughout the week the Windsor Show basked in the sunshine of Royal favour and presence. The Society has been honoured for many years by the active support of H.R.H. the Prince of Wales, and it had in earlier years the high privilege of counting the late Prince Consort among its best friends. Never before, however, has the Society been brought so closely into relationship with the Royal House or received such distinguished marks of favour from the Crown. Among the many modes in which Her Majesty expressed her interest in the event may be mentioned her gracious permission to allow the State apartments to be accessible to the public, notwithstanding her presence at the Castle, and to permit the public to visit the Prince Consort's Shaw and Flemish Farms during the Show week. The bestowal of a knighthood on Mr. Jacob Wilson, the Honorary Director, was also felt to reflect honour on the Society for which he has during so many years assiduously laboured.

At the Council Meeting held on July 3, the following autograph letter from Her Majesty was read and ordered to be entered on the minutes:—

Windsor Castle, July 2, 1889.

It gave me very great pleasure to visit the Show of the Agricultural Society, of which I am this year the President, and I can assure you that I was extremely gratified with this magnificent Exhibition.

I must thank the Council for the care and attention they have devoted to this work, which has been so successful, and I am especially anxious to convey my acknowledgments to Sir Jacob Wilson and Mr. Ernest Clarke for their exertions in organising this Show.

(Signed) VICTORIA, R.I.

To the Council of the Royal Agricultural Society of England.

The details of the several departments of the Show which appear in the reports printed in the following pages make it unnecessary to refer to the various exhibits; but it may be permitted to me briefly to mention two novelties in the Show-ground—one of which added greatly to the entertainment, the other to the comfort of the visitors. For the first time since 1878 a band was added to the attractions of the Meeting, and throughout the week Lieut. Dan Godfrey and his musicians of the Grenadier Guards had a numerous and gratified auditory. The St. John Ambulance Association considerably provided in the Showyard a completely fitted ambulance station, which was

under the charge of Mr. John Furley, Director of the Ambulance Department of the Order of St. John of Jerusalem in England. During the Show forty-four cases of accidents, wounds, or general ailments were dealt with, but only nine of these were at all serious. Mr. J. W. Gooch, M.R.C.S., of Windsor, kindly acted as medical officer in charge, and he was assisted by his partner, Mr. Norris, and by Mr. E. W. Phillips, house-surgeon of the Royal Infirmary, Windsor. Mr. S. Osborn gave two days, and Mr. W. H. Pratt and Mr. F. G. Brown each one day, so that there was at least one surgeon on duty every day of the week, besides fifteen trained first-aid helpers. The facilities afforded by the ambulance station were greatly appreciated, and the Society's warmest thanks are due to the Association and to Mr. Furley for their services in the matter.

A special office, with an interpreter, was provided by the Society for the convenience of foreign visitors, and 115 persons availed themselves of it. More than half of these were Germans, the remainder comprising Belgians, Swedes, Spaniards, one or two Frenchmen, one Turk, one Pole, and several Americans and Australians. Among the distinguished official visitors may be mentioned Mr. G. E. Morrow, Representative of the United States Department of Foreign Agriculture; the Baron Lucius von Ballhausen and Herr von Thiel, of the Berlin Ministry of Agriculture; and M. Paul de Vuyst, of the Ministry of Agriculture, Belgium. Most of the inquirers were professors in agricultural colleges, delegates from agricultural societies, and breeders of stock.

The number of visitors to the Show exceeded the expectations of those who from long experience realise the effect which a railway journey of any length or difficulty has in checking the attendance of the general public. That the total was so great must be attributed not so much perhaps to the proximity of the vast population of the metropolis, as to the enthusiasm aroused among agriculturists of all classes throughout the kingdom. Never probably in the history of the Society have its members flocked so unanimously to its support. The Secretary of the Society has prepared a Memorandum as to the attendances and receipts, which I think it best to reproduce in his own words in an Appendix.

It is impossible to conclude an account of the Great Show without referring to the loyal and hearty co-operation of all concerned in its management. It is little short of marvellous that so vast an organisation—pieced together, so to speak, with infinite pains and care for one brief week—should have worked with so little friction. This result could only have been attained by the

cheerful and unstinted energy of those charged with the details of the Meeting. Nor should a word of thanks be lacking to the police, who performed their difficult and responsible duties with the zeal and thoroughness to which, happily, we are so well accustomed. To one and all, indeed, who helped to make the Show the success which it was, the Society's thanks are eminently due.

My only apology to readers of the Journal for these somewhat lengthy remarks is that they refer to the Great Show, which is now a matter of history.

May the Royal Agricultural Society of England, whose motto is "Practice with Science," and whose Jubilee we commemorated last June, continue to flourish and live to celebrate its centenary under equally happy auspices!

I have now to say good-bye to my brother Stewards and all officials connected with the management of the Society's Country Meetings, and in doing so I thank all for their personal kindness to myself, for they have indeed been "oft to my faults a little blind."

Memorandum by the Secretary of the Society on the Attendances and Receipts at the Windsor Meeting.

The receipts at the doors and at the grand stands during the Windsor Show week were on the whole quite as great as could be expected, considering the distance from London and the absence of that large population in immediate proximity to the Showyard on which the Society has customarily to rely for its gate-money. A journey to the Show this year meant for the ordinary sightseer not merely a short walk over the hill on a special half-holiday, as was the case on the Thursday of the Nottingham Meeting, when 88,832 persons paid for admission, but a railway journey of uncertain duration and some expense as well.

The first day (Monday), when the judging was going on throughout the yard, and when, therefore, there was but little to attract the ordinary non-professional visitor, was surprisingly good. No less than 6,223 persons paid five shillings on that day, and in addition 2,382 Members of the "Royal" were admitted free. Only twice before in the history of the Society has there been so large an attendance on the judging day, viz. at Birmingham in 1876 and at Liverpool in 1877, and never has there been a more distinguished assemblage to watch the awards of the Judges.

There could be no advantage in attempting to contrast the attendances day by day with those of previous Shows, since weather, local circumstances, and special attractions like Royal visits count for much in determining the number of visitors; but the figures in the Table at the top of p. 481 will show that the attendance on the two half-crown days at Windsor (Tuesday and Wednesday) was distinctly better than the average.

Thursday was a day *hors ligne*. The visit in semi-state of Her Majesty the Queen in her capacity as President of the Society was naturally an occasion when well-wishers of the Meeting would make a point of attending; and the receipts on that day (3,929*l.*) were, with two exceptions, larger than ever before, having only been exceeded on a half-crown day at Manchester in 1869 (4,953*l.*), and on the phenomenal shilling day last year at Nottingham (4,418*l.*). Remembering the unusual difficulties this year of

	Kilburn 1879	Derby 1881	York 1883	Preston 1885	New- castle 1887	Notting- ham 1888	Windsor 1889
First half-crown day	21,147	12,314	15,768	21,713	11,331	11,103	18,809
Second half-crown day	9,431	18,130	21,820	19,318	12,020	9,057	24,690

bringing a large concourse of persons to the Showyard, the attendance of 32,965 visitors on the "Queen's day" is a noteworthy fact.

The attendance on the shilling days was somewhat disappointing. Great efforts had been made to attract the attention of Londoners to the Show, and it might reasonably have been hoped that on the Saturday, with its wellnigh universal half-holiday, large crowds would have flocked to see the most wonderful and comprehensive exhibition of live-stock which England has ever seen. But this was not the case. The London public appear to require an exhibition to be in their very midst and to be open for some time before they can persuade themselves that it is worth seeing. Hence the special characteristic of the Meeting was not so much the attendance of large crowds as the fact that it was a great rallying-point for the members of the Society and for interested agriculturists generally, many of whom came hundreds and nearly all came scores of miles to visit it.

The number of visitors on the first shilling day was 44,493, which, though good under the special circumstances of railway difficulties, has been many times exceeded. The attendance on the last day (Saturday) was only 28,034, making the total number of visitors 155,707.

This attendance ranks fourth in the history of the Shows, the other occasions on which more than 150,000 persons have passed the turnstiles being Manchester (1869) 189,102, Kilburn (1879) 187,323, and Birmingham (1876) 163,413.

A comparison of the attendance of visitors at the three great Metropolitan Exhibitions shows that Windsor stands between Battersea and Kilburn in point of numbers:

Days	Battersea (June 23 to July 2) 1862	Kilburn (June 30 to July 10) 1879	Windsor (June 22 to 29) 1889
Saturday	—	—	493 ¹
Monday	363 ¹	4,319	6,223
Tuesday	806 ¹	3,317	18,809
Wednesday	1,146	21,147	24,690
Thursday	5,873	9,431	32,965
Friday	10,056	35,162	44,493
Saturday	8,644	50,255	28,034
Monday	28,092	43,554	—
Tuesday	38,131	10,190	—
Wednesday	31,217	5,702	—
Thursday	—	4,246	—
Total	124,328	187,323	155,707

¹ Only Implement Yard open.

At Battersea and Kilburn the Showyard was open to the public for nine and ten days respectively. At Windsor it was open for seven days, or only one day longer than the ordinary period. In comparing the attendance at the three Shows this fact should be borne in mind.

The total receipts taken at the doors were 13,244*l.* 3*s.* 8*d.*, to which

must be added 320*l.* 15*s.* 6*d.* for Season Tickets at 10*s.* 6*d.* each, 586*l.* 19*s.* 6*d.* for Day Tickets issued in books at the rate of 25 for 1*l.*, and 680*l.* 19*s.* 9*d.* for the Society's share of the Cheap Combination Tickets issued at 3*s.* each on the shilling days, making 14,832*l.* 18*s.* 5*d.* in all. Catalogues were sold to the amount of 1,098*l.* 17*s.*; 1,117*l.* 17*s.* 6*d.* (by far the largest amount on record) was taken for admission to the grand stand, and 158*l.* 16*s.* 9*d.* as fees for the stand at the Dairy and sales of Dairy Produce, thus raising the total receipts from visitors to 17,208*l.* 9*s.* 8*d.* This exceeds by 1,000*l.* the Kilburn receipts (16,214*l.*), when the Show was open for 10 days, and is only exceeded by Manchester, where there was a succession of splendid attendances, and the total receipts were 18,114*l.*

In view of the exceptional efforts which the Society had made to render the Show worthy of the occasion, it was impossible to hope that the receipts from entries and the gate-money would be sufficient to meet all the heavy expenditure of the Society for prizes, buildings, preparation of the ground, printing, compilation of catalogues, forage, Judges' fees, and the cost of administration. Obviously, with a Show more than twice the usual size, these expenses were very greatly swollen beyond the average; so that, with various exceptional outgoings in connection with the Meeting, it is not surprising that the total expenditure should have exceeded the total receipts by some 4,890*l.*

As no detailed statement of the receipts and admissions at the Society's Country Meetings has been published in the Journal since 1877, it may be interesting to continue up to date the Tables of the receipts for each of the Shows from Lewes (1852) to Liverpool (1877), then given as an appendix to Mr. Bowen-Jones's Report as Senior Steward of Implements at Liverpool. (Vol. XIII. 2nd Series, pp. 579 *et seq.*)

STATEMENT OF RECEIPTS AND ADMISSIONS

AT EACH OF THE COUNTRY MEETINGS

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND

From 1878 to 1889 inclusive.

[These figures represent only the takings during the period of the Show itself, as reported by the Stewards of Finance. Sundry receipts from Catalogues, &c., after the Show-week are not included.]

BRISTOL, 1878.

Dates of Admission	No of persons admitted	Price of Admission	Total receipts from Admissions	Charge for Horse-ring	Receipts at Horse-ring	Receipts from sale of Catalogues
			£ s. d.		£ s. d.	£ s. d.
Tuesday, July 9 . . .	70 ¹	5/	17 10 0	—	—	18 10 0
Wednesday, July 10 . .	2,119	5/	529 11 3	1/	25 18	123 10 0
Thursday, July 11 . . .	19,223	2/6	2,402 17 11	1/	78 11	195 0 0
Friday, July 12 . . .	22,404	2/6	2,800 15 0	1/	84 15	123 14 0
Saturday, July 13 . . .	48,214	1/	2,351 0 6	1/	47 11	50 0 0
Monday, July 15 . . .	30,012	1/	1,501 5 9	1/ and /6	14 0	38 11 6
Season Tickets . . .	—	10/6	669 6 0	—	—	—
<i>Total No. of Admissions</i>	122,042	—	10,272 6 5	—	250 15	549 5 6

Grand Total of Receipts during Bristol Meeting £11,072 6*s.* 11*d.*

¹ Implement Yard only open.

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Dates of Admission	No. of persons admitted	Price of Admission	Total receipts from Admissions	Charge for Horse-ring	Receipts at Horse-ring	Receipts at Working-Dairy	Receipts from sale of Catalogues
KILBURN, 1879.							
Monday, June 30 . . .	4,819	5/	£ 1,005 8 10	2/	£ 95 8 0	—	£ 256 10 0
Tuesday, July 1 . . .	3,817	5/	828 16 0	2/	32 7 0	—	75 0 0
Wednesday, July 2 . . .	21,147	2/6	2,643 19 11	2/	267 12 0	—	325 0 0
Thursday, July 3 . . .	9,481	2/6	1,178 5 5	—	—	—	95 0 0
Friday, July 4 . . .	35,162	1/	1,759 5 1	—	—	—	142 0 0
Saturday, July 5 . . .	50,255	1/	2,478 1 8	1/	144 1 0	—	104 10 0
Monday, July 7 . . .	43,554	1/	2,165 5 6	1/	101 8 0	—	144 15 0
Tuesday, July 8 . . .	10,190	1/	508 4 1	—	—	—	20 0 0
Wednesday, July 9 . . .	5,702	1/	284 16 0	—	—	—	12 0 0
Thursday, July 10 . . .	4,246	1/	212 6 6	—	—	—	15 5 0
Season Tickets . . .	—	10/6	1,818 7 0	—	—	—	—
Total No. of Admissions	187,323	—	14,382 16 0	—	640 16 0	—	1,190 0 0

Grand Total of Receipts during Kilburn Meeting . . £16,213 12s. 0d.

CARLISLE, 1880.

Saturday, July 10 . . .	270 ¹	2/6	83 15 0	—	—	—	—
Monday, July 12 . . .	2,455	5/	618 17 6	2/	49 4 0	7 9 0	160 0 0
Tuesday, July 13 . . .	9,459	2/6	1,182 19 5	2/	96 15 0	21 14 0	180 0 0
Wednesday, July 14 . . .	13,164	2/6	1,645 16 9	2/	114 19 6	18 4 0	145 0 0
Thursday, July 15 . . .	42,682	1/	2,140 8 8	1/	78 12 6	16 19 0	85 0 0
Friday, July 16 . . .	23,981	1/	1,200 8 10	1/	86 17 6	10 2 0	55 5 6
Season Tickets . . .	—	10/6	620 14 0	—	—	—	—
Day Tickets . . .	—	—	35 17 0	—	—	—	—
Total No. of Admissions	92,011	—	7,473 12 2	—	421 8 6	74 8 0	625 5 6

Grand Total of Receipts during Carlisle Meeting . . £8,594 14s. 2d.

DERBY, 1881.

Tuesday, July 12 . . .	866 ¹	2/6	45 15 6	—	—	—	—
Wednesday, July 13 . . .	3,256	5/	812 0 0	2/	60 10 0	9 2 0	172 0 0
Thursday, July 14 . . .	12,314	2/6	1,517 0 4	2/	107 10 0	10 2 0	165 0 0
Friday, July 15 . . .	18,130	2/6	2,267 18 7	2/	148 16 0	9 4 0	124 9 0
Saturday, July 16 . . .	53,291	1/	2,670 14 0	1/	38 5 0	6 11 0	94 0 0
Monday, July 18 . . .	40,639	1/	2,018 11 10	1/	41 10 0	7 5 0	77 6 0
Season Tickets . . .	—	10/6	827 2 0	—	—	—	—
Day Tickets . . .	—	—	41 15 6	—	—	—	—
Total No. of Admissions	127,996	—	9,700 17 9	—	396 11 0	42 4 0	632 15 0

Grand Total of Receipts during Derby Meeting . . . £10,772 7s. 9d.

READING, 1882.

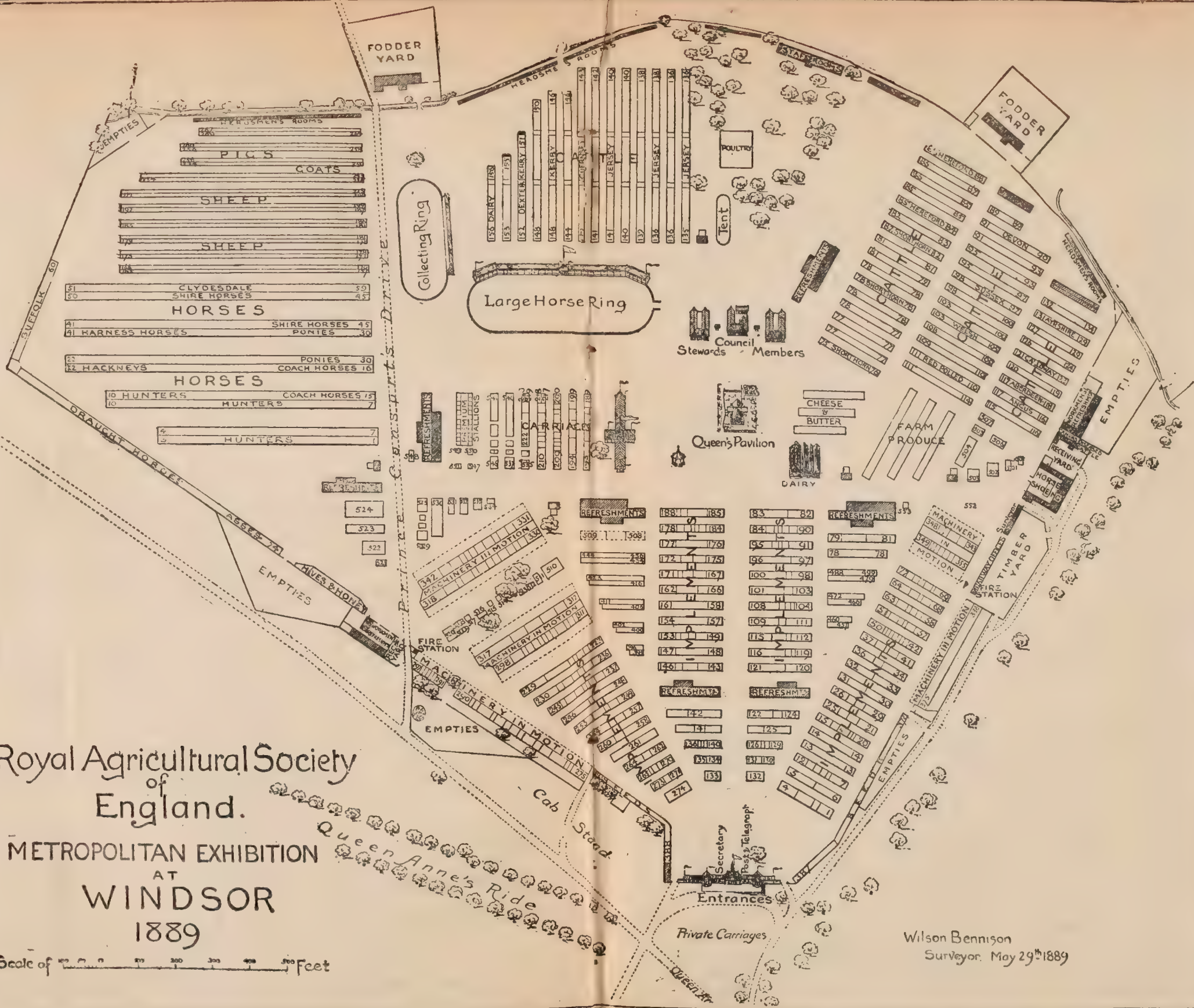
Saturday, July 8 . . .	155 ¹	2/6	19 7 6	—	—	—	—
Monday, July 10 . . .	1,717	5/	429 10 0	2/	35 12 0	6 10 0	135 10 0
Tuesday, July 11 . . .	5,662	2/6	707 17 0	1/	54 3 0	10 9 0	116 10 0
Wednesday, July 12 . . .	13,461	2/6	1,678 12 6	1/	89 13 0	22 16 0	160 0 0
Thursday, July 13 . . .	42,437	1/	2,121 18 11	1/	78 13 0	—	91 0 0
Friday, July 14 . . .	19,511	1/	903 16 6	1/	37 5 0	—	49 9 6
Season Tickets . . .	—	—	243 4 0	—	—	—	—
Day Tickets . . .	—	—	80 0 0	—	—	—	—
Total No. of Admissions	82,943	—	6,184 6 5	—	295 6 0	39 15 0	552 9 6

Grand Total of Receipts during Reading Meeting . . £7,071 16s. 11d.

¹ Implement Yard only open.

Royal Agricultural Society
of
England.
METROPOLITAN EXHIBITION
AT
WINDSOR
1889

Scale of 0 100 200 300 400 Feet



Wilson Bennison
Surveyor. May 29th 1889

486 *Report of the Senior Steward of Implements at Windsor.*

Dates of Admission	No. of persons admitted	Price of Admission	Total receipts from Admissions	Charge for Horse-ring	Receipts at Horse-ring	Receipts at Working Dairy	Receipts from sale of Catalogues
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YORK, 1883.

			£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.
Saturday, July 14 . . .	300 ¹	2/6	35	2	6	—	—	—	—	—	—	—	—	—	—
Monday, July 16 . . .	3,012	5/	752	16	6	2/	88	12	0	4	2	0	210	0	0
Tuesday, July 17 . . .	15,768	2/6	1,971	14	4	1/	122	13	0	24	8	0	237	10	0
Wednesday, July 18 . . .	21,820	2/6	2,728	6	3	1/	103	15	0	11	9	0	210	0	0
Thursday, July 19 . . .	63,097	1/	3,158	13	4	1/	104	9	0	10	9	6	223	8	0
Friday, July 20 . . .	24,120	1/	1,140	17	6	1/	34	14	0	5	9	6	45	14	0
Season Tickets . . .	—	10/6	480	15	2	—	—	—	—	—	—	—	—	—	—
Day Tickets . . .	—	—	50	14	9	—	—	—	—	—	—	—	—	—	—
Total No. of Admissions	128,117	—	10,319	0	4	—	454	3	0	55	18	0	926	12	0

Grand Total of Receipts during York Meeting . . . £11,755 13s. 4d.

SHREWSBURY, 1884.

			£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.
Saturday, July 12 . . .	194 ¹	2/6	22	10	0	—	—	—	—	—	—	—	—	—	—
Monday, July 14 . . .	2,183	5/	545	19	0	2/	37	12	0	4	14	0	150	0	0
Tuesday, July 15 . . .	11,211	2/6	1,401	8	11	1/	95	18	0	11	0	0	180	0	0
Wednesday, July 16 . . .	13,474	2/6	1,685	7	9	1/	78	7	0	10	11	0	162	0	0
Thursday, July 17 . . .	49,374	1/	2,401	16	4	1/	94	5	0	11	8	6	138	0	0
Friday, July 18 . . .	17,690	1/	872	1	6	1/	23	12	0	6	18	0	31	10	0
Season Tickets . . .	—	10/6	237	4	8	—	—	—	—	—	—	—	—	—	—
Day Tickets . . .	—	—	80	10	0	—	—	—	—	—	—	—	—	—	—
Total No. of Admissions	94,126	—	7,246	18	2	—	329	14	0	44	11	6	661	10	0

Grand Total of Receipts during Shrewsbury Meeting . £8,282 13s. 8d.

PRESTON, 1885.

			£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.
Tuesday, July 14 . . .	394 ¹	2/6	47	13	0	—	—	—	—	—	—	—	—	—	—
Wednesday, July 15 . . .	3,557	5/	889	1	6	2/	64	18	0	5	2	0	205	0	0
Thursday, July 16 . . .	21,713	2/6	2,717	1	4	2/	269	7	6	7	16	0	255	0	0
Friday, July 17 . . .	19,318	2/6	2,394	9	1	1/	113	12	0	4	16	0	136	17	6
Saturday, July 18 . . .	34,302	1/	1,692	7	0	1/	60	18	0	4	14	0	58	17	0
Monday, July 20 . . .	14,908	1/	745	10	4	1/	42	4	0	2	14	9	35	19	0
Season Tickets . . .	—	10/6	476	5	6	—	—	—	—	—	—	—	—	—	—
Day Tickets . . .	—	—	78	16	0	—	—	—	—	—	—	—	—	—	—
Total No. of Admissions	94,192	—	9,041	3	9	—	550	19	6	25	2	9	691	13	6

Grand Total of Receipts during Preston Meeting . . £10,308 19s. 6d.

NORWICH, 1886.

			£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.
Saturday, July 10 . . .	148 ¹	2/6	16	13	0	—	—	—	—	—	—	—	—	—	—
Monday, July 12 . . .	625	5/	156	5	3	2/	21	16	0	0	19	0	67	10	0
Tuesday, July 13 . . .	8,074	2/6	1,009	16	2	2/	171	8	0	3	17	0	101	0	0
Wednesday, July 14 . . .	10,894	2/6	1,361	14	0	2/	131	0	0	4	17	0	64	6	0
Thursday, July 15 . . .	42,774	1/	2,141	5	0	1/	104	8	6	7	9	6	60	12	0
Friday, July 16 . . .	42,394	1/	1,937	5	10	1/	90	19	0	38	14	9 ²	33	2	9
Season Tickets . . .	—	10/6	149	15	6	—	—	—	—	—	—	—	—	—	—
Day Tickets . . .	—	—	66	5	0	—	—	—	—	—	—	—	—	—	—
Total No. of Admissions	104,909	—	6,838	19	9	—	519	11	6	55	17	3	326	10	9

Grand Total of Receipts during Norwich Meeting . . £7,740 19s. 3d.

¹ Implement Yard only open.

² This amount includes 35*l*. 9*s*. 3*d*. for Butter, Milk, Cheese, Guides, &c., sold at the Dairy.

Report of the Senior Steward of Implements at Windsor. 487

Dates of Admission	No. of persons admitted	Price of Admission	Total receipts from Admissions	Charge for Horse-ring	Receipts at Horse-ring	Receipts at Working Dairy	Receipts from sale of Catalogues
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NEWCASTLE-ON-TYNE, 1887.

			£ s. d.		£ s. d.	£ s. d.	£ s. d.
Friday, July 8 . . .	82 ¹	2/6	10 3 6	—	—	—	—
Saturday, July 9 . . .	1,127 ¹	1/	55 5 0	—	—	0 3 0	—
Monday, July 11 . . .	1,097	5/	274 5 0	2/	40 16 0	0 13 0	129 10 0
Tuesday, July 12 . . .	11,331	2/6	1,402 13 1	2/	230 11 6	3 0 0	134 0 0
Wednesday, July 13 . . .	12,020	2/6	1,514 4 0	2/	134 19 0	7 4 0	95 19 0
Thursday, July 14 . . .	77,410	1/	3,864 2 0	1/	167 7 6	12 13 6	131 10 0
Friday, July 15 . . .	24,305	1/	1,209 18 3	1/	79 3 0	66 19 11 ²	53 2 6
Season Tickets . . .	—	10/6	243 18 0	—	—	—	—
Day Tickets . . .	—	—	17 0 0	—	—	—	—
Total No. of Admissions	127,372	—	8,591 8 10	—	652 17 0	90 13 5	544 1 6

Grand Total of Receipts during Newcastle Meeting . . £9,879 0s. 9d.

NOTTINGHAM, 1888.

			£ s. d.		£ s. d.	£ s. d.	£ s. d.
Saturday, July 7 . . .	1,826 ¹	1/	89 13 6	—	—	—	—
Monday, July 9 . . .	1,671	5/	417 19 3	2/	31 2 0	3 9 0	123 0 0
Tuesday, July 10 . . .	11,103	2/6	1,388 6 7	2/	154 11 0	8 16 0	147 0 0
Wednesday, July 11 . . .	9,057	2/6	1,131 6 3	2/	61 9 6	6 7 0	82 0 0
Thursday, July 12 . . .	88,832	1/	4,418 8 8	1/	153 14 0	11 4 0	181 2 0
Friday, July 13 . . .	35,438	1/	1,771 10 9	1/	96 10 0	46 18 2 ³	58 9 10
Season Tickets . . .	—	10/	156 7 6	—	—	—	—
Day Tickets . . .	—	—	35 15 0	—	—	—	—
Total No. of Admissions	147,927	—	9,409 7 6	—	497 6 6	76 14 2	591 11 10

Grand Total of Receipts during Nottingham Meeting . £10,575 0s. 0d.

WINDSOR, 1889.

			£ s. d.		£ s. d.	£ s. d.	£ s. d.
Saturday, June 22 . . .	493 ¹	2/6	54 2 0	—	—	0 15 0	—
Monday, June 24 . . .	6,223	5/	1,548 4 9	2/6	111 7 6	4 13 0	288 0 0
Tuesday, June 25 . . .	18,809	2/6	2,259 3 4	2/6	238 7 6	16 2 0	270 0 0
Wednesday, June 26 . . .	24,690	2/6	2,836 14 2	2/6	277 16 0	10 4 0	190 0 0
Thursday, June 27 . . .	32,965	2/6	3,929 12 2	2/6	313 2 6	20 19 0	193 0 0
Friday, June 28 . . .	44,493	1/	1,587 6 9	1/	123 9 0	4 5 6	113 10 0
Saturday, June 29 . . .	28,034	1/	1,029 0 6	1/	53 15 0	101 18 3 ⁴	44 7 0
Day Tickets, sold in } Books at 25 for 11. }	Incl. in } above }	—	586 19 6	—	—	—	—
Railway Tickets on } 28th and 29th . }	Incl. in } above }	9d.	680 19 9	—	—	—	—
Season Tickets . . .	—	10/6	320 15 6	—	—	—	—
Total No. of Admissions	155,707	—	14,832 18 5	—	1,117 17 6	158 16 9	1,098 17 0

Grand Total of Receipts during Windsor Meeting . . £17,208 9s. 8d.

¹ Implement Yard only open.

² This amount includes 64l. 12s. 5d. for Butter, Milk, Cheese, &c., sold at the Dairy during the week.

³ This amount includes 43l. 10s. 2d. for Butter, Milk, Cheese, &c., sold at the Dairy during the week.

⁴ This amount includes 99l. 8s. 9d. for Butter, Milk, Cheese, &c., sold at the Dairy during the week.

XXVII.—*Report on the Implements Exhibited at Windsor.*
By THOS. H. THURSFIELD, F.S.I., Reporting Judge.

Judges.

THOMAS BELL, Hedley Hall, Marley Hill, Whickham, R.S.O., Durham.

MASON COOKE, The Lawn, Ely, Cambridgeshire.

THOS. H. THURSFIELD, Barrow, Broseley, Shropshire.

No part of the Jubilee Show of the Royal Agricultural Society, held under the presidency of Her Majesty the Queen at Windsor in 1889, more fully exemplifies the great progress and the wonderful development of agriculture during the fifty years' life of the Society, than does the Implement and Machinery Department.

Fifty years ago, the typical farmer little heeded either science or steam; he did not even think of electricity. The village blacksmith and wheelwright were his implement-makers; from them he could obtain all he required in the way of machinery. He would have been greatly astonished if he had seen the implements necessary to the modern farmer, and the cost would have upset him entirely. He was content to go on, as his father had done before him, with the "old wooden plough," and he generally looked upon anything new with a jealous feeling of prejudice. As says the old song:—

Aye, an old Wooden Plough, and they say, to be sure,
As the wideawake Farmer mun use 'em no more,
They mun all be of iron, and wood there's no trade for,
Why, what do the fools think as Ash Trees were made for?

Meanwhile he was, perhaps unknowingly, about to take part in far greater changes than he ever dreamt of—the changes brought about by the Royal Agricultural Society, linking together "Practice with Science." He was entering upon the era of invention: steam was in its infancy—railways had not yet made the world grow smaller.

The Agricultural Show of 1839 at Oxford was the turning-point. It brought ploughs and other implements together from all parts of the country. "It afforded a favourable opportunity of contrasting the implements of different parts of the country, and to many there was novelty even in those which had in distant districts been in constant use." Comparative trials were originated, the fittest survived, and progress was made on all sides with rapid strides. Agriculture has always shown itself capable of combating (it may be, perhaps, but slowly) the difficulties now and again arising in its path, by depending on the energy and skill of the farmer, who on his part has looked to

the teaching of the various Agricultural Societies and Farmers' Clubs to lead him in the newer times in which he has had to cope with hitherto unknown hindrances. He has had to keep abreast with the age, and the successive Shows have helped him to do this by bringing him into direct contact with the agricultural engineers, who may fairly lay claim to having helped very considerably the advancement of agriculture. With agriculture, necessity is the mother of progress and reform. To realise this fully, one has only to turn to the earlier numbers of the Journal of the Royal Agricultural Society. Take the first Meeting of the Society (or rather of the English Agricultural Society, as it was then termed) held at Oxford on Wednesday, July 13, 1839, when the following were the only implements exhibited :—

- Mr. J. Le Boutillier, of St. Mary's, Isle of Jersey, a small one-horse plough, for setting potatoes, and a paddle plough for tilling the ground.
- Mr. W. J. Hannam, of Burcott, Oxon., a Wilkie (of Udington) expanding horse-hoe and harrow.
- Mr. W. J. Hannam, of Burcott, Oxon., a ridging and moulding plough.
- Messrs. W. & C. King, of Southmore, Berks, a narrow-wheeled Berkshire wagon, with iron axle-tree.
- Mr. J. Springall, of Ipswich, Suffolk, patent wrought-iron corn-stack stand.
- Mr. James Gardner, ironmonger, of Banbury, patent turnip-cutting machine.
- Mr. J. Gibbs, of Elsfeld, a draining plough.
- Mr. H. J. Hannam, of Burcott, Oxon., a one-horse harvest cart.
- Messrs. Jones and Draper, of Charlbury, a "scorcher" machine.
- Mr. J. Adams, of Great Tew, Oxon., a wrought-iron plough, with mould-boards, &c.
- Mr. W. J. Hannam, of Burcott, Oxon., a one-horse heavy roll.
- Mr. Samuel King, of Buckland, Faringdon, a swing plough and other implements.
- Mr. W. J. Hannam, of Burcott, Oxon., a Perry and Barnett's (of Reading) light plough for a single horse.
- Mr. T. White, Coundon, near Coventry, a new subsoil plough.
- Mr. C. Hart, of Wantage, a four-horse portable thrashing machine, a swing plough for two horses, a wheel ditto for three ditto, and a 14-wheel land presser.
- Mr. T. Salter, of Great Hallingbury Hall, an improved corn-dressing machine.
- Mr. T. Grounsell, of Louth, a newly-invented drill, to deposit seed and manure at the same time.
- Mr. W. J. Hannam, of Burcott, Oxon., a Cumberland one-horse cart, with a spring key or tilting stick.
- Mr. W. Armstrong, Hawnes, Beds, newly-invented harrow.
- Mr. R. Edmunds, of Banbury, two improved turnip machines.
- Mr. J. Russell, of Kenilworth, Warwickshire, a subsoil plough.
- Mr. P. Cox, of Stow, Gloucestershire, a dynamometer, &c.
- Mr. E. J. Lance, Barossa Cottage, near Bagshot, machines for sowing manure and seeds at the same time.
- Messrs. Ransome, of Ipswich, Suffolk, ploughs, chaff-cutters, thrashing-machine, &c., &c.

The following was the award of Premiums :—

- To Messrs. Ransome, of Ipswich, the Society's gold medal, for their excellent display of implements, and especially their chaff-cutting machines and Biddell's scarifier.
- To Mr. John Clarke, of Long Sutton, Lincolnshire, the Society's silver medal, for his Universal ridge plough.
- To Mr. Grounsell, of Louth, the Society's silver medal, for his drop drill for depositing wet or dry manure with the seed.
- To Mr. T. Salter, of Hallingbury, Essex, the Society's silver medal, for his machine for dressing corn.
- To Mr. John Le Boutillier, of Jersey, five pounds, for his paddle plough for raising potatoes.

The report in the Journal, Vol. I., states that the gold medal was awarded to Messrs. Ransome, of Ipswich, who "sent up their waggons laden with more than six tons of machinery and implements of superior manufacture." Special attention is called to the chaff-cutting machines applicable to steam-, water-, horse-, or hand-power, Biddell's scarifier, Clarke's ridge plough, and "a variety of other ploughs," including Lord Somerville's double-furrow plough, and subsoil ploughs, all exhibited by Messrs. Ransome. Mr. Hart, of Wantage, exhibited some clever ploughs; "one also by Mr. Howard, of Bedford, of small size, with a mould-board of an excellent form, calculated to give the least resistance in turning over the furrow, was much approved." There were three threshing machines in the yard: one by Messrs. Ransome—a 4-horse portable—was commended both for durability and efficiency in getting up the required speed, "which is said to be 310 revolutions of the beating-drum to one of the horse;" one by Mr. Garrett, to thresh from 30 to 40 quarters per diem; and one by Mr. Hart. Drills by Messrs. Garrett & Sons, and by Mr. Jeago, of Peasinghall, and a drop-drill by Mr. Grounsell, of Louth, are noticed; and also waggons by Stratton of Bristol, and King of Berkshire. The newly-invented machine, called a "scorcher," for burning straw, weeds, or even charring the soil after harvest, attracted the observation of the curious. It was about three feet wide, on wheels, containing a fire-box, and a fan by which the flame was driven through a narrow aperture.

At the Cambridge Meeting in the following year there were 31 exhibitors of implements, with 36 entries in the Catalogue; and the report of that Meeting in Vol. II. of the Journal gives the following "as implements which appeared to the Judges, from novelty and general utility, to deserve the Society's honorary rewards":—

- To Mr. Beart, of Godmanchester, for his tile and sole making machine.
- To Mr. Grounsell, of Louth, for an improvement in his dropping-drill.

To Messrs. Garrett, of Saxmundham, for their corn and turnip drill with movable axle and swing steerage.

To Mr. Wood, of Stowmarket, for his barley roller.

To Mr. Crosskill, of Beverley, for his clod-crushing roller, and liquid manure cart.

To Mr. Wedlake, for his corn and stubble rake with balance weight.

To Mr. Hannam, of Dorchester, Oxfordshire, for his skeleton harvest cart.

Messrs. Ransome, of Ipswich, also appeared to the Judges to merit the commendation of the Society for their unrivalled collection of machinery of all descriptions; a bank of their ploughs (86 varieties) were arranged and elevated on planks to the height of at least twenty feet, and struck the eye of the beholder as he entered the yard, nor did a nearer inspection diminish his admiration.

No steam-engine of any kind was shown either at Oxford or Cambridge. It is believed that the first portable steam-engine which was introduced to the notice of the agricultural world was that shown at Liverpool in 1841, and was thus referred to in the report upon the implements exhibited there:—

“To Messrs. Ransome, of Ipswich, the Society is indebted for what may be termed the great novelty of the Meeting—viz. the exhibition of a portable steam-engine¹ for the purposes of threshing corn. The advantages of steam-power for working fixed threshing-mills have long been acknowledged in the northern parts of England and Scotland, but we believe that this is the first attempt to render it portable, so that it may be transported from one farm to another, or from one part of a farm to another, as easily and as expeditiously as the present machines with horse-works.” The trial of this machine and of two hand-threshing machines formed the subject of a special report, and the Judges also spoke of the “vast stride in the mechanics of agriculture” in the two years since the Oxford Meeting, in words which are of interest at the present day as showing the great impetus given to agricultural implement-making by the Society’s earlier Shows.

“At Oxford,” they said, “there were some examples of good machinery and workmanship, but many more of rude, cumbrous, and ill-executed implements. At Liverpool many machines were exhibited not only of surpassing skill in contrivance and execution, but also having for their object the effecting of processes in tillage-husbandry of the most refined nature and acknowledged importance, but hitherto considered of very difficult practical attainment. Some of these may already be considered as forming part of the necessary apparatus of every well-managed farm, and to be essential to its economy and profit. This vast stride in the mechanics of agriculture, made within so short a period, has doubtless arisen from the congregating together of agriculturists and mechanics from all parts of the empire; and a still higher perfection in machinery may be confidently anticipated from the opportunity offered, under the auspices of the Society, of periodically contrasting and estimating the merits of varied implements used for similar purposes in different localities and soils. It is apparent that the manufacture of even the commoner instruments has already, to a great

extent, passed out of the hands of the village ploughwright and hedge-carpenter, and been transferred to makers possessed of greater intelligence, skill, and capital." (Vol. II. 1841, p. ciii.)

This engine was afterwards converted into a locomotive, and again tried at the Bristol Meeting in 1842, in conjunction with a travelling engine by Mr. Cambridge. A prize of 30*l.* was awarded to Messrs. Ransome, and one of 15*l.* to Mr. Cambridge.

"The Judges consider it questionable whether the substitution of steam for horses, as the force employed to move portable agricultural steam-engines from place to place, will be found either convenient or economical; they cannot, however, but highly commend the simplicity and effectiveness of the machinery applied by Messrs. Ransome to accomplish this purpose. The engine travelled at the rate of from four to six miles per hour, and was guided and manœuvred so as to fix it in any particular spot with much ease. It also turned in a very small compass." (Vol. III. 1842, p. 351.)

Great results have come from this beginning. There still remains, however, a large field open for invention, and also for improvements in existing implements and machines. There were many labour-saving machines shown at Windsor which are not found in practical use throughout the country, though it may be that they are not yet sufficiently perfected.

Electricity has already been applied to agricultural machinery, but I am not aware that anything of this kind has ever been exhibited at a Show of the Society. The first fifty years of the Society have been passed in what may be termed the age of steam. The next fifty will doubtless see electricity developed in a way hitherto little thought of, and we may feel sure that agriculture will take its place upon the list of industries which must be benefited.

The perusal of the early numbers of the Journal shows that amongst our landowners and leading agriculturists many of the names which are now well known in the Showyards were equally well known when the Society was in its infancy. It is interesting to note, in view of Lord Moreton being the President of the Society for the ensuing year, that in an article in the first volume, by Mr. Philip Pusey, M.P., on draught in ploughing, there is a description and illustration of an "improved Scotch swing-plough from Lord Moreton's example farm."

The following prizes for Implements were offered by the Society at the Windsor Meeting:—

CLASS 1.—Fruit and vegetable evaporator, suitable for use on a farm—

FIRST PRIZE	.	.	.	.	.	£30
SECOND PRIZE	.	.	.	.	.	20

CLASS 2.—Paring and coring machine—

FIRST PRIZE	.	.	.	.	.	£10
SECOND PRIZE	.	.	.	.	.	5

CLASS 3.—Collection of Hand Tools for road-making, including scrapers, rakes, picks, shovels, hammers, barrows, and gravel riddle, and any other tools adapted for the purpose—

FIRST PRIZE .	:	:	:	:	:	£10
SECOND PRIZE	:	:	:	:	:	5

I regret to say that there was only one entry in Class 1 ; only one in Class 2 ; and none at all in Class 3.

The First Prize was awarded in Classes 1 and 2 ; and eleven Silver Medals were (with the consent of the Council and Stewards) also awarded for New Implements.

The following list shows the awards :—

CLASS 1.—FRUIT AND VEGETABLE EVAPORATOR *suitable for use on a farm.*

1105 First Prize of £30 to Ph. Mayfarth & Co., of Frankfort-on-Main, Germany, for Evaporator No. 2 for Fruit and Vegetables ; “ Ryder Patents.”

CLASS 2.—PARING AND CORING MACHINE.

1124 First Prize of £10 to The Goodell Co., of Antrim, New Hampshire, U.S.A.

SILVER MEDALS.

Art. No.

- 166 William Weeks & Son, of Maidstone, Kent, for Hop Washing Engine “ Simplex.”
- 1483 Aylesbury Dairy Co., Limited, St. Petersburg Place, Bayswater, W., for “ Butter Extractor,” manufactured by the Extractor Company, Stockholm.
- 2616 Crocker & Co., of Dorchester, Dorset, for C. J. Foster’s patent corrugated Finger Bar.
- 2984 John V. Gibbons, of Tetworth, Oxfordshire, for Hay Tedder.
- 3242 Strawsons’, Limited, of London and Newbury, Implement for the distribution in small quantities per acre of concentrated liquid manures and insecticides on ground crops, and convertible into a machine for broad-cast sowing and for distributing nitrate of soda and other agricultural fertilizers.
- 3348 W. & T. Avery, of Digbeth, Birmingham, for Steelyard registering Gross and Tare.
- 3362 Henry Pooley & Son, of Albion Foundry, Liverpool, for patent self-contained Weighbridge.
- 5209 Priestman Bros., of Hull, Yorkshire, for 6-horse-power portable Oil Engine.
- 5304 Marshall, Sons & Co., Limited, of Gainsborough, Lincolnshire, for portable Chaff Cutter.
- 5494 Samuel Corbett & Son, of Wellington, Shropshire, for combined Turnip Cleaner and Slicer.
- 7210 William A. Stone, of Prague, Austria, for Rising Switches for narrow gauge field railways.

The Judges commenced work punctually at nine o’clock on the morning of Thursday, June 20, and were able by seven o’clock at night to form some idea of what they had to do, and to arrange a definite plan of procedure. The Catalogue dis-

closed some interesting particulars—553 stands and 7,446 articles (including seeds, manures, &c.), of which no less than 133 were implements classed for the special examination of the Judges as “New Implements for Agricultural and Estate Purposes,” competing for the Society’s Silver Medals. These figures are eloquent when put side by side with those at earlier Meetings of the Society:—

1839.	Oxford	54 implements.
1840.	Cambridge	115 ”
1841.	Liverpool	312 ”
1842.	Bristol	455 ”
1843.	Derby	508 ”
1844.	Southampton	948 ”
1845.	Shrewsbury	942 ”

The articles in the Catalogue extended over a wide range—from the Royal Pavilion to the ornate rustic houses of Messrs. Cæsar, of Knutsford, Cheshire; from the powerful traction engine to the two-and-ninepenny apple-parer; from the electric carriage to the tiny electric working model (Art. 4366), (which, I believe, share between them the honour of being the first electric motors exhibited at a Royal Show); from the finest old Highland whisky from Perth (Art. 6670) to the pure aerated water from the Cwm Dale Spring, Stretton Hills, Shropshire (Art. 6442); and last, but not to be passed over in silence (Art. 6654), Neurasthenipponskelesterizo. To each and all of these the Judges were courteously asked to give at least a passing recognition.

It may be convenient to deal with the awards and notices in the following order, taking all according to their numbers in the catalogue:—

- I. Articles to which Prizes were awarded.
- II. Articles to which Silver Medals were awarded.
- III. Steam-engines.
- IV. Dairy implements.
- V. Miscellaneous.

I. PRIZES.

Ph. Mayfarth & Co., Frankfort-on-Main, Germany (Art. No. 1104-7).—The only competitors for the special prizes offered for fruit and vegetable evaporators by the Society were Messrs. Mayfarth & Co., who exhibited four different-sized evaporators, “Ryder Patents,” numbered from 0 to No. 3, according to size.

These machines were similar to the Ryder Patent Evaporator, exhibited last year by Messrs. Robinson & Allen, of Liverpool, and fully described and illustrated in Part I. page 107, of

the present volume of the Journal, the only modification being the addition of an outer air-jacket round the stove. For trial, the No. 2 machine was selected as the most suitable for the requirements of a middle-sized farm.

A preliminary trial of the machine was made, when samples of carrots, parsley, and apples were passed through the machine, the appearance of the dried products at once warranting a further trial.

Experiment No. 1.—Fifteen pounds weight of apples were weighed out; they were peeled, cored, and sliced, or cut into rings, and the net weight of fruit placed in the evaporator was 10 lbs. 15 ozs., the dried weight of which was 1 lb. 11 ozs., the whole time occupied being 5 hours 35 minutes. The time occupied in drying this quantity of fruit is no guide to the capacity of the machine, as the smaller pieces of apple obviously dry more rapidly than the larger ones (some being finished within $2\frac{1}{2}$ hours); in regular working such dried pieces would be removed as soon as dried, the fruit on the trays would be re-arranged, and additional fruit added to the lower trays.

Experiment No. 2.—The evaporator was again heated up; 145 lbs. 11 ozs. of apples were weighed out; these were peeled, cored, and sliced, the net weight put into the evaporator being 106 lbs. 15 ozs. The first dried portions of the apples were taken out of the machine within 1 hr. 55 mins. of charging; the whole was finished in $9\frac{1}{2}$ hrs., and the weight of dried fruit was 15 lbs. 4 ozs., which presented a uniform appearance and was of excellent quality.

From this experiment it would appear that the waste in peeling and coring amounts to a little over 1-4th of the gross weight, and that the dried product weighs about 1-10th of the gross weight.

Some cherries were then tried; they were unfortunately anything but a good sample of fruit to start with; the drying, however, was complete, and any deficiency in appearance was fairly attributable to the bruised condition of the fruit.

To produce a good sample of dried fruit, much depends upon the skill and attention of the operator. Thus, in drying apples, the short exposure to the atmosphere, after peeling and slicing, until the portions can be arranged on the trays ready for drying, will cause them to lose their white appearance and turn them brown, which discolouration is intensified by drying. To obviate this, as soon as they are sliced, they are at once plunged into water in which a small quantity of salt is dissolved. Other kinds of fruit, dried in their skins, may require steaming to some extent.

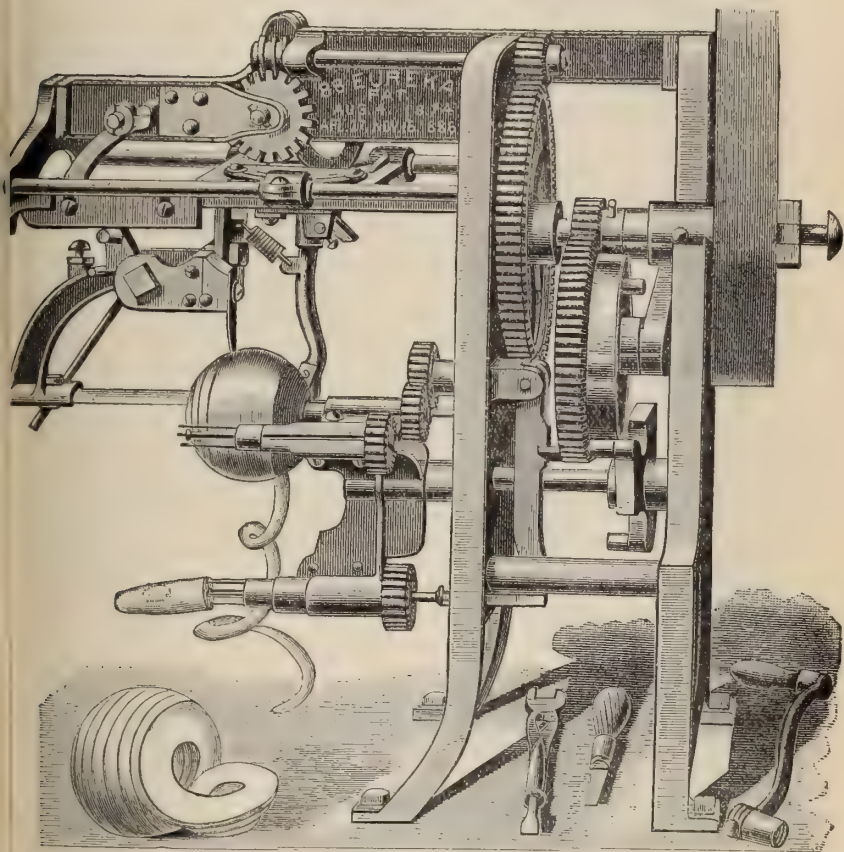
It is much to be regretted that other evaporators were not entered for the prizes, since, although the Judges satisfied themselves that the machine tried could satisfactorily and well answer the purpose required, still nothing brings out the best points of any machine like a thoroughly methodical competitive trial. In many parts of the country, at some period or other, fruit and vegetable growers, either from an over-abundant crop or from unsuitable weather, are not able to make the best of their products. Jam factories have already been successfully established to dispose of such surplus fruit as is suitable for the purpose; and although the special conditions which promote fruit evaporation in America are not present here, there is no reason why it may not become an independent and successful business in this country. The English farmer is very careful before he embarks on any new enterprise, but if once a system of fruit-evaporating were practically brought before him, it would soon gain ground, as other American "notions" have done before. The whole apparatus is extremely simple, and not costly; and a movable machine which could, at a reasonable outlay, convert any surplus fruit or vegetables from wasted products into wholesome food, capable of being stored and disposed of by degrees, would be a great benefit to the producer. It is true it requires considerable skill properly to dry the fruit or vegetables, but experience would soon teach this. The demand for the evaporated fruits and vegetables is certainly increasing; they have been tried, and are thoroughly appreciated, and are now to be seen in the shops in every town. Surely the growers in this country will not continue to waste what is being utilised in America and brought to their own doors for sale, under the system so fully described in the *Journal*, Vol. XXIV. p. 486, by Mr. Pidgeon.

The difficulty of obtaining fruit of different kinds in sufficient quantities, at the time of the Windsor Show, prevented the Judges from giving the machine a trial sufficiently exhaustive to enable them to speak with certainty as to the economic advantages of the system. It is probable that it would not answer to evaporate the best kinds of keeping fruits, or indeed any kind for which there is a good demand ready at hand; but there can be no question that much excellent and valuable food may be produced by the aid of these machines from fruit and vegetables which are at times allowed from one cause or other to rot upon the ground.

The Goodell Company, Antrim, New Hampshire, U.S.A. (Arts. No. 1120-24).—This firm exhibited a collection of paring, slicing, and coring machines of various sizes and designs, most

of which were remarkable for their extreme ingenuity and efficiency. Of these, No. 1124, "Eureka," was selected by the Judges for trial in connection with the award offered by the Society for paring and coring machines. This machine may be worked either by hand or power.

Fig. 1.—*Eureka Paring and Coring Machine.*



Three 3-prong forks, upon which the apples are placed, are mounted on a revolving frame with intermittent motion; between the prongs of the forks is a loose rod or spindle, which, on fixing the apple on the prongs, is pushed backwards and projects through the casting on which the forks are mounted. This frame in revolving brings the ends of these spindles in contact with a projection which pushes the spindles forward and

consequently shoves the apples off the forks. The forks themselves have a revolving motion given to them independent of that of the frame. The cycle of operations is as follows:—An apple placed on the first fork is brought into position against the paring knife, which is held up by a spring, and has a certain lateral motion given to it; the apple revolving is pared; an arm with a cutter very much like a gouge chisel then enters the centre of the apple, cutting round the core, and when this is finished the projection behind the fork frame pushes forward the loose spindle between the prongs of the fork and throws off the apple. While the above operation is going on, an apple is placed on the next fork, and so on. The movements, however, are so rapid that, with the machine running at its steady working speed, it would keep one person fully occupied merely putting the apples on to the forks as they came round.

In the trial that was made of this machine, 100 apples were pared and cored in 7 minutes 10 seconds, but this cannot be taken as any test of the rate at which the machine would work, as the operator was not in any way an expert at working it—indeed, it was as much as he could do to fix the apples on two out of the three forks of the machine. The paring and coring were done very well, there being no excessive percentage of waste in either. Four other machines were exhibited by this firm for doing similar work, of various sizes, the smallest (Art. No. 1120), at a cost of 2s. 9d., being admirably suited for domestic purposes. The fork upon which the apple is fixed is mounted on the end of a travelling screw, which conveys the fruit past the paring knife and then up to a stationary curved coring knife.

II. SILVER MEDALS.

The Hop-Washing Engine (Art. 166), exhibited by *Messrs. W. Weeks & Son, Maidstone*, shows several improvements upon their machines, which have been for some time in use both in Worcestershire and Kent. It consists of a substantial iron tank 3 feet 3 inches long, 1 foot 6 inches broad, by 2 feet 9 inches deep, carried on a pair of iron road wheels 3 feet diameter by 4 inches broad, the axle passing through a sleeve secured inside the tank, and the wheels are connected to the axle by means of the usual ratchet attachment. The tank is covered by a pair of hinged lids, and in the rear opening is inserted a wooden box, the bottom of which is formed of a finely-perforated strainer.

Inside the tank and towards its rear end are fixed a pair of inclined brass pump-barrels, 3 inches diameter by 5 inches stroke; the buckets are actuated through connecting rods by a

double crank, with throws in opposite directions, placed above the road-wheels axle. One end of the crank works in a bearing attached to the inner side of the tank, the other end passes through the side and carries a pinion which is put into gear by a clutch and lever, the hand end of which passes to the rear of the tank. The pinion is driven by a spur-wheel about four times its diameter, secured on to the road-wheels axle.

The suction pipes of the pump are protected by finely-perforated bottle-shaped strainers, and the pumps deliver into a small flat air-vessel secured to the outside of the rear of the tank. The air-vessel is fitted with a regulated relief valve, which discharges any surplus fluid back into the tank. On each side of the air-vessel are four half-inch taps, with loose valves which prevent backward flow, and four flexible rubber pipes which communicate with four sparging pipes arranged on the sides of the machine, and supported from the tank by brackets which allow of the levels of the three lower pipes to be altered, and also permit of lateral adjustment and turning round axially to any angle. The upper pipe on each side is carried about 6 inches above the tank, and the two converge somewhat towards its front. The end of one pipe is fitted with a cock communicating with a cross pipe ending in a blank cap. All these pipes have one row of pin-holes pitched from $2\frac{1}{4}$ to 3 inches, and their ends are closed with brass caps, which can readily be removed for cleaning. The tank is fitted with a brass-capped emptying pipe.

The shafts are attached to the tank in a peculiar way. At the upper part of the two front corners are strong brackets to which the shafts are fixed by means of vertical pins $\frac{7}{8}$ -inch in diameter, fitted with loop upper ends and pointed lower ends, so that they can be easily withdrawn. When one pin is taken out the shafts can turn sideways on the other at right angles to the tank, the extent of motion being defined by a pair of short chains attached to the shafts and hitched on to a pair of hooks in the front of the tank. The shafts are tubular, and are strongly framed at their rear ends so as to support their weight during the lateral movement. At the rear of the tank is a pair of handles used for working the implement round at the end of the rows. The effect of this arrangement is that the machine can be turned in very little space, without taking the horse out of the shafts, it is said, in the 6-foot headland between 6-foot rows. The draught appears rather much for one horse. Traveling at three miles an hour, the pumps would make about 112 revolutions per minute and deliver about 38 gallons in the same time, provided no fluid was returned by the relief valve to the tank. It is obvious that any one of the sparging pipes can be

laid out of action by shutting off its connection with the air-vessel, and the force of the jets can be regulated by the degree of pressure put on the relief valve.

This machine is intended to throw a strong solution of some kind of wash or insecticide (quassia chips boiled, and soft soap, are found satisfactory) with a pressure sufficient to hit hard at about 16 feet in an upward stream, so as to destroy blight on the under-side of the leaves. It is used for early washing with two pipes each side, and as the bine increases three and then four pipes are used each side. Large tubs of the wash are placed at suitable positions in the hop grounds, as reservoirs for replenishing when necessary.

The machine was tried with water, which it delivered about 18 feet high, in strong jets, completely covering the horse and everything near, and from the manner in which it washed the boughs of the oak trees it was evident that for its special purpose it was an effective machine; but it would appear that when worked as shown to the Judges, it would require very frequent replenishing.

The Aylesbury Dairy Company, Limited, exhibited anew Swedish Cream Separator and Butter Extractor (Art. 1483), which constitutes a completely new departure in butter-making, and may, if it should prove successful in prolonged practice, possibly abolish both the churn and the dairymaid.

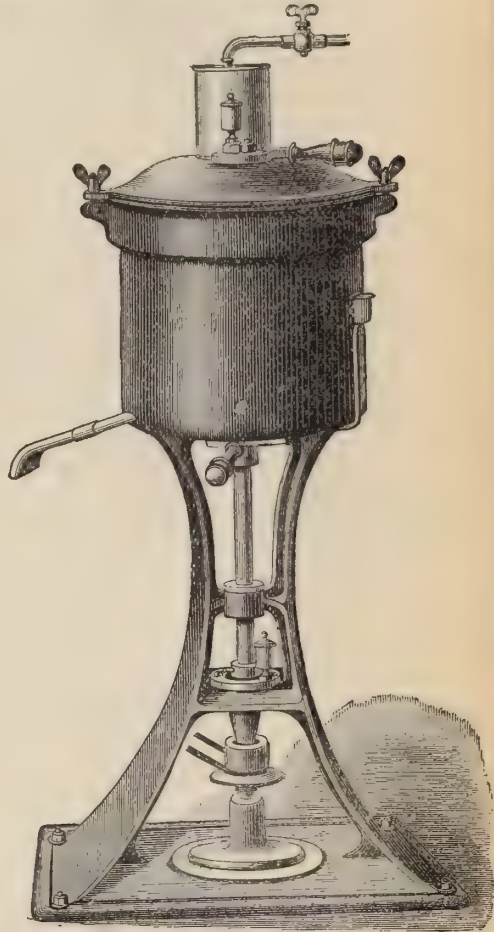
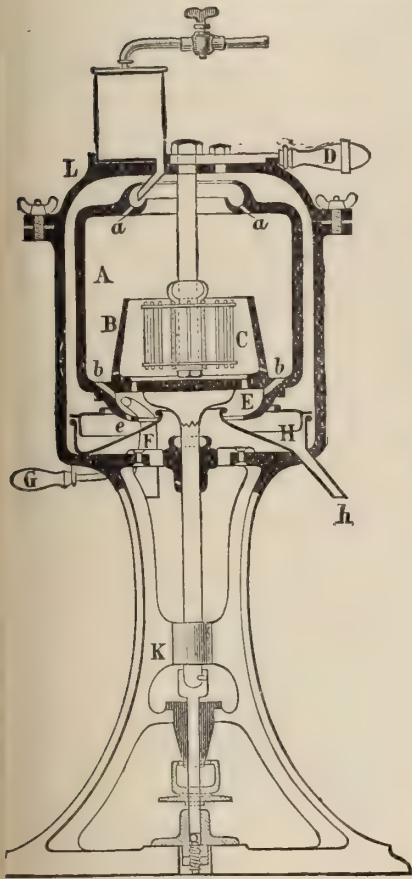
The operation of churning, as is well known, consists in agitating cream, which is itself only a mass of separate fat globules interfused with milk, until such globules cohere, and the freed fluid originally entangled among them passes away as "butter milk."

It recently occurred to Mr. C. A. Johansson, a Swedish inventor, that the agitation necessary to bring about this result might be given in the centrifuge itself, and while the separation of milk and cream was going on. With this end in view, he furnished the milk drum with a cover, from the centre of which there hangs a vertical axle, which becomes concentric with, or slightly eccentric to, the centrifuge, by turning a graduated handle this way or that.

A circular cage, composed of half a dozen thin vertical wires, is supported from, and free to turn around the axle in question: while the milk drum is provided with a second and smaller annular chamber, which, as the spinning proceeds, becomes entirely filled with the cream-ring, whose internal diameter, determined by the position of escape ducts in the floor of this chamber, is very slightly greater than that of the "agitating cage."

The latter is made to touch the cream-ring at one point in its circumference by turning the handle governing the eccentric spindle, and can thus be more or less deeply immersed in

Fig. 2.—*Swedish Cream Separator and Butter Extractor.*



the cream. The cage is set revolving by contact with the cream-ring, just as a pinion is turned by a wheel; but it fails to attain quite the same speed as its driver, on account of its own inertia. Its wires, which pass vertically down from top to bottom of the cream-ring, thus create a considerable agitation among the superficial layer of fat-globules, and, it is claimed, convert them

into butter, which, as milk flows into the centrifuge, passes away continuously through ducts provided for that purpose in the floor of the inner cream chamber.

A greater or less agitation follows on setting the cage more or less eccentrically with the milk drum, and creams of different character or density are dealt with in this way.

It was arranged that this machine should be tried on Wednesday, June 26, at 3 P.M., with 20 gallons of milk. The Judges attended at the annexe to the Working Dairy, and after carefully weighing the milk, and taking samples, the machine was started, only to run a few minutes, when it was found that in putting together the machine after cleaning (it had previously been working satisfactorily) something had been omitted, and consequently the trial had to be abandoned. Later in the afternoon the Judges again attended, and were honoured by the presence of the Royal Princesses and other distinguished visitors. Two hundred pounds of milk were weighed out and all put together, and carefully mixed in a can and samples taken. I should state that the inventor wished to reduce the milk to 60°, but time would not permit, and the milk used for the trial was 65°.

The machine was started at	h. m.				
	. 5	23		Butter came at	h. m.
Skim milk came at	. 5	30			. 5 33½
Commenced churning at	. 5	32½		Finished at	. 5 47

On completion—

Weight of skim milk was	.	.	.	183¾ lbs.	} 200 lbs.
„ butter and butter milk was	.	.	.	16¼ „	
„ butter made up	.	.	.	7 „	

Dr. Voelcker certified as follows:—

Original Milk	{	Total solids	.	.	.	12.41 per cent.
		„ fat	.	.	.	3.45 „
Skim Milk	{	Butter-fat	.	.	.	0.30 „
		Solids (total)	.	.	.	10.11 „

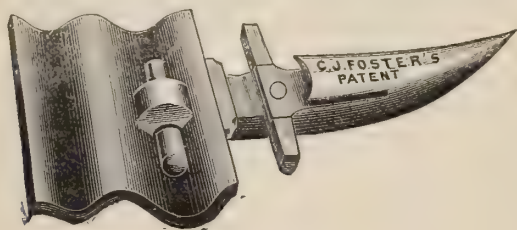
The butter was lumpy rather than granular, somewhat soft and pale-coloured, and would not have passed muster with the butter made by Miss Maidment in the Dairy, though it tasted better than a great deal of the butter sold throughout the country.

The Judges awarded a Silver Medal to this ingenious machine, as an example of *advance* in a new but highly important field. They are not prepared to say that it was demonstrated that the Centrifugal Butter Extractor is yet a complete practical success, but they feel they would have done injustice, not only to the inventor, but to the members of the Society, had they failed to draw attention to this machine in the most emphatic way they could.

It may, perhaps, be urged that the award of the Society's Silver Medal should be withheld from all machines whose practical value has not been fully demonstrated, on the ground that such awards are in the nature of guarantees given by the Society. This is perfectly true in the case of competitive trials, where, as in a race, there must be a first and a second, while it is the office of the Judge to declare the winner's name. But, in recommending the award of the medal, the Judge simply affirms that, *in his opinion*, a certain implement has sufficient merit or promise of merit to justify its being brought to the notice of the public. The Judge may err herein, undoubtedly, for, without scientifically conducted competitive trials, it is very easy to do so; yet it would be shirking a responsibility imposed on him by his very choice as Judge if he did not sometimes reward promise as well as performance. When that promise is great, and its field of action highly important, it is his bounden duty to "back his opinion," and he may do so fearlessly because he knows that every intelligent man will, before buying, read his report and note his qualifications, especially in cases where, whatever the presumptive merit, there has been no opportunity for the exhaustive examination of a competitive trial.

Messrs. Crocker & Co., Dorchester, exhibited in connection with one of their "Eclipse" Mowers, C. J. Foster's patent corrugated finger-bar (Art. 2616). The greater strength obtainable

Fig. 3.—Foster's Patent Corrugated Finger-Bar.



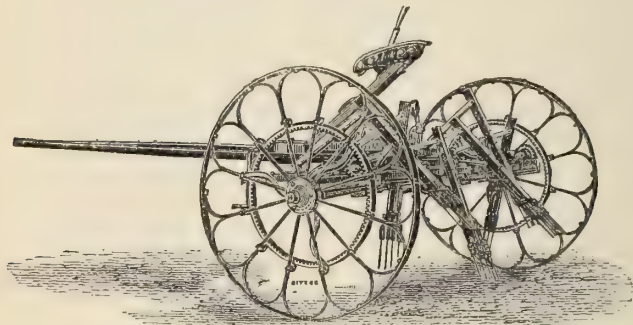
in a corrugated section must be apparent to any one who contrasts the greater rigidity of a thin corrugated plate as compared with a flat plate of the same weight. This gain in strength at once enables a lighter finger-bar to be used. In addition to this, the corrugated section of finger-bar lends itself admirably to a simple, efficient, and inexpensive attachment of the fingers, which is effected in the following manner. A rectangular slot is cut by a milling machine at given intervals in the forward corrugation of the bar; a boss on the shank of the finger, with a hole through it, fits accurately into this slot, and the finger is

secured into place by driving a taper steel split-pin through the hole, as shown in the illustration on page 503 (fig. 3). Any side thrust on the fingers is taken up by the bearing of the shoulder on the finger against the front edge of the finger-bar.

A comparison of this bar with one of flat section by the same maker gave an advantage of about one-fifth in weight in favour of the former. The underneath side of the bar, with the fingers attached, presented a surface well suited for working close to the ground. The advantages claimed by this arrangement seem to be fully borne out, and its novelty and extreme simplicity met with the approval of the Judges.

Mr. John V. Gibbons, Haseley Iron Works, Tetsworth, Oxfordshire, showed the "Haseley Tedder," Gibbons's patent (Art. 2984), the action of which may be best generally described as a

Fig. 4.—*Haseley Tedder.*



series of spring forks working with a very similar action to that of the Darby digger.

The motion is given to two three-throw crank shafts by means of annular geared wheels on the main travelling wheels of the machine. On each of these cranks is a four-tined fork made of spiral spring steel $\frac{1}{4}$ -inch diameter, mounted on to an ash shaft, slung at about the middle of its length to the crank. The upper end of the shaft is connected, by means of two flat iron bars, to a pivot on the fore part of the framing. The forks with their shafts and pivoted connecting bars are called by the patentee "kickers."

The brackets to which the connecting bars are pivoted are extremely simple. A light cast-iron bracket, with the base made to grip the wooden frame of the machine, has a projection on top with a wrought-iron pin cast in, on which the two bars connecting the upper end of the "kicker" are pivoted. On each side of this bracket there are two projections, placed so as

to allow the connecting bars to be slipped on in a given position, but which effectually prevent their becoming disengaged in any ordinary working position. The holes in the connecting bars are bushed with malleable cast-iron bushes.

The raising and lowering of the forks is done by a lever, close to the driving seat of the machine, actuating rods connected to the fore and aft part of the frame in the ordinary way.

The throwing in and out of gear is also very simple. The fork lever actuating the same is pivoted loosely on a pin, the stroke being quite sufficient to throw the clutch boss of the small pinion out of gear, without actually withdrawing the teeth out of gear with the main driving wheel. When, however, the machine goes out of the field, the small pinion may be drawn completely out of gear by simply lifting the striking lever off the pin and pivoting it on another one close alongside. This not only throws the whole machine out of gear, but prevents the possibility of its being put into gear when travelling on the road, unless the lever is wilfully shifted on to the other pin.

The driving wheels deserve some notice. The boss of cast-iron is made in halves, at right angles to the axis of the wheel, recessed so as to take the arms. The arms are made of light wrought-iron bars bent almost into a loop, the ends of which are laid in the recesses in one-half of the boss; a ring is then dropped into recesses prepared in the ends of the arms, and the other half boss is placed on top, and the whole securely bolted together with three bolts. The annular geared ring is secured to the arms by means of eye bolts slipped on to the same, which bolts also serve for tying the arms together. The arms are secured to the rim of the wheel by means of small malleable clips with two rivets. The whole machine has been designed with the view that it may at any time be dismantled, and any spare part substituted, without the necessity of any special tools and with as little trouble as possible.

The Hay-kicker was tried upon the Flemish Farm in a strong crop of long ryegrass and clover. It did not turn the crop over, but lightened it up thoroughly and well, both when going with the swathes or when crossing them, and in a manner that would not knock out the seeds of the ryegrass. In the heavy crop it appeared at times to be quite enough for one horse to work, but neither the horse nor driver had ever worked the machine before, and both seemed rather out of place. The machine did not block in the longest or heaviest part of the crop, and it seems to be an implement which may be more particularly suited for the heavy crops of ryegrass in the Fen district (where machines are often stopped by the length of the ryegrass

causing it to coil round the barrel). It is also suited for crops which are over ripe, and the seeds easily shaken out.

Strawsons, Limited, of London and Newbury, were awarded a Silver Medal for the "Strawsonizer" (Art. 3242), a new kind of distributor for seeds, fertilisers, dressings and insecticides, either solids or liquids.

The principle consists in creating a strong blast of air by means of a fan, and of spreading the blast by means of directing-pipes or plates, and allowing the substance which is to be distributed, if in the solid form, to fall into the blast and be carried away with it, or, if in the liquid state, to be drawn into the current of air and pulverised into a fine spray.

The body of the machine is mounted on a frame resting on a pair of iron wheels 4 feet in diameter by 3 inches wide, and is attached to a pair of shafts arranged for a single horse, with provision for a second one placed tandem.

The fan is secured to the body, and is driven by a spur-wheel about 18 inches diameter, keyed on to the road-wheel axle, to which the wheels are attached by the ordinary ratchet-gear. This spur-wheel actuates a pinion fitted to a second motion-shaft—a spur-wheel, on which actuates a pinion keyed on to a third motion-shaft, which carries a pulley about 14 inches diameter by 2 inches wide, which, by means of a short belt, drives a small pulley on the fan-spindle. The fan, which is about 9 inches diameter, has close sides, the inlets are $4\frac{1}{2}$ inches diameter, and the delivery-pipe, 3 inches wide and discharging to the rear, is controlled by a sliding-pinion on the second motion-shaft, thrown in and out of gear by a lever placed conveniently to the driver's hand.

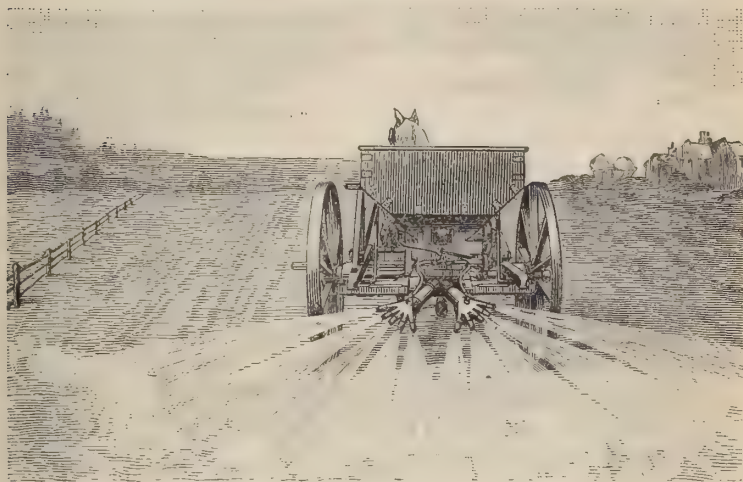
In the case of Art. 3240, intended for broadcasting corn, clover, and other seeds, a wooden hopper is arranged over the delivery-pipe of the fan, and the seeds are fed down by means of a stirrer and one smooth-roller, which are actuated by pitched chains driven off the road-wheels axle and controlled by a clutch and lever placed by the driver's side. The slot or opening in the bottom of the hopper is regulated by a slide, which can be closed by means of a lever also placed by the driver's side. The seeds as they fall into the blast strike against an adjustable fan-shaped plate, about 11 inches radius, fitted with six radiating distributing ribs or partitions, about 1 inch high, and are thus carried upwards and backwards in the form of a magnified fan, so as to fall on the ground in a shower about 7 yards wide.

If the machine is required to sow nitrates or fertilisers of a similar nature, the feed is effected by means of a serrated roller instead of a smooth one, on account of the sticky nature of the salt.

Art. 3242 is arranged for the distribution of concentrated liquid manures and insecticides on ground crops, and also for urban sanitary purposes, and is convertible for sowing seed or fertilisers broadcast.

The blast is directed into a pipe which divides into two branches, each branch terminating in five nozzles, about $\frac{5}{8}$ -inch diameter, fixed at such angles as to produce a uniform fan-like current of air across the course of the machine. Up the centre of each nozzle passes a brass pipe about $\frac{1}{16}$ -inch diameter, and these unite in a main pipe, which is connected to the supply-

Fig. 5.—*The Strawsonizer.*



tank by a flexible hose, $\frac{3}{8}$ -inch diameter, controlled by a cock, the two pipes uniting in a common pipe, which, issuing from the cistern, is controlled by a cock actuated by a lever placed at the driver's side. The supply-cistern is of tin of a pyramidal form with the apex turned downwards, with a circular opening for filling in its flat top, fitted with a fine conical strainer and a close-fitting lid. The machines weigh about 8 cwt. each, and the fans are geared 225 to 1, so that at three miles an hour the fans make 4,750 revolutions per minute.

Art. 3243 was arranged for broadcasting, and also for dressing hops and other high crops.

Inside the wooden hopper is placed a tin cistern similar to that already described. The air pipe divides into four branches, the two lower of which have five $\frac{5}{8}$ -inch jets, each directed sideways and upwards. The two middle branches have jets $1\frac{3}{8}$ -inch diameter

each, fitted with four brass pipes about $\frac{1}{8}$ -inch bore, for delivering the vertical spray. Each branch has an india-rubber pipe armed with a regulating cock, which connects it to the centre pipe issuing from the cistern, and also governed by a cock which can be operated by a lever placed at the driver's side. The road wheels of this implement are only 3 feet diameter by 4 inches wide, to accommodate it better to the contracted space in which it would have to work.

The Judges commenced work with trials of this machine on Saturday morning, June 22, upon the Flemish Farm. It was arranged that, in order to save time in changing fittings, four machines should be tried, two fitted for broadcasting solids and two for distributing liquids. The same machine can, however, be arranged so as to effectually distribute both solids and liquids. A machine was first charged with 56 lbs. of common salt. In order to judge of the distribution, large sheets of cardboard covered with wet black varnish were laid down. From these it was seen that the salt was spread upon a track about 23 feet wide, which was covered with a very regular and finely distributed coating of the salt. It was exactly what a gunmaker would term a perfectly regular "pattern"; no bunches or vacant spaces, but the whole covered with white pellets, or particles of salt, much more evenly than I have ever seen done by any other means when dealing with so small a dressing. The distance over which the machine travelled was then marked and measured, and found to be 665 yards 1 foot; the width being taken, rather under than over, at 20 feet, would show that 3 r. 26 p. of land had been covered by the 56 lbs. of salt, or at the rate of 61 lbs. per acre. If the machine travelled from $2\frac{1}{2}$ to 3 miles per hour it would cover from 6 to 7 acres per hour.

During this trial the Judges were honoured by a visit from His Royal Highness the Prince of Wales, the Acting President, accompanied by His Royal Highness the Duke of Cambridge. The Prince of Wales, having dismounted, examined the machines, and watched the trial with great interest. Two pecks of barley were next put into another machine, similar to the last, except that it had a smooth roller to deliver the barley instead of the serrated one used for the salt. A large cloth was laid down to show the distribution, which was quite as regular as the salt. The distance covered by the machine whilst sowing the barley was 209 yards 2 feet; taking the width at 18 feet, this would show that 1 r. 1 p. was sown with the two pecks of barley, or at the rate of two imperial bushels per acre. Supposing the machine travelled at the rate of $2\frac{1}{2}$ or 3 miles an hour, and covered a track 18 feet wide, it would sow $5\frac{1}{2}$ to $6\frac{1}{2}$ acres per hour.

One and a half gallons of water were then put into the tank of another machine, and the nozzles for distributing insecticides on ground crops were put on. These delivered the spray so minutely divided that it was difficult to realise what was being done. Hardly anything could be seen except that a fog or cloud seemed to cover the ground, and on examination it was seen that each blade of grass or pebble was sprinkled over with the dew, like a Scotch mist, which, however, very quickly evaporated in the intense heat. It covered *well and thoroughly* a track 5 yards wide. This would extend over 6 rows of turnips 27 inches apart. The distance travelled by the machine in distributing the $1\frac{1}{2}$ gallon of water was 665 yards 1 foot; taking the width at 15 feet, this would be at the rate of $2\frac{1}{5}$ gallons per acre. Supposing the machine travelled at the rate of $2\frac{1}{2}$ to 3 miles per hour, it would cover from $1\frac{1}{2}$ to $5\frac{1}{2}$ acres per hour.

Another machine was then tried, having nozzles adapted for the distribution of insecticides in the air for hop gardens. The machine was tried upon some oak trees—it thoroughly soused branches and leaves, 16 feet high, so that they bent from the force of the spray, for in this trial the water was delivered in perpendicular sprays, from both sides of the machine, in the same minutely divided condition; but it was evident that it struck the leaves hard, and would thoroughly cover them with any similar liquid used.

I will venture to say that the first idea of every farmer looking upon this machine for the first time would be to judge for himself if it was likely to accomplish what is claimed for it (and what it has in fact accomplished), viz., to combat successfully with what is called the “turnip fly,” or flea beetle, one of the greatest pests that a farmer has, and which pays him an annual visit with great regularity. In 1786, Arthur Young stated that the turnip crop destroyed in Devonshire alone was valued at 10,000*l.*, and in early numbers of the *Journal* we read of various remedies which have been tried—the Paul net, in which were once caught a quart-bottleful of the beetles, who had been decoyed by some early sown turnips, and were thus cleared away before the main crop came; a newly-painted board or sheet drawn over the turnips, which catches the beetles against it as they leap when disturbed; fumigation, by burning stubble or weeds to windward of the field, so that the smoke may drive the beetles away; drawing elder boughs over the small plants; dressing the plants with an infusion of wormwood to render them bitter and unpalatable. Snuff, also, and smelling-salts are named, with many other equally potent concoctions, but all

to no purpose. In the report of the implements exhibited at the Bristol Meeting of the Royal Agricultural Society in 1842, an implement having for its object the destruction of the fly is described thus :—

The ingenuity of Mr. Huckvale, of Over Norton, has also been exercised in the construction of an implement for depositing or sprinkling liquid manure. It consists of two water-tight cases for carrying the fluid, fitted into the manure boxes of his turnip-drilling machine. The fluid is conveyed through a pipe into a second reservoir, in which works a wheel with cups. These collect and throw out the liquid in the desired quantity on the turnip ridges. He applies the same machine to pass along the ridges to sprinkle the young plants with a fluid which he represents as destructive to the fly. A premium of 3*l.* was adjudged to the inventor for his mechanical skill in bringing about these ends, of which the precise effect and value can however only be ascertained by a practical trial and experience. (*Journal*, Vol. III. [1842] page 343.)

All this points to the great need that there is of a machine of this kind. I should mention that there is trustworthy evidence of successful work on two badly infested fields upon which it has been used, and particulars of which are given in the appendix to the "Twelfth Report on Farm Pests," lately issued by Miss Ormerod, the Consulting Entomologist of the Royal Agricultural Society. If the same result should be generally attained, we may safely hail this machine as one of the most important additions to the implements of the farm. Judging from the trials which the Judges carried out, they would seem to show that, apart from the special interest which attaches to the machine as a means of freeing the turnip plant from a great pest, there is also every reason to think that practical experience and use will show that for the further purposes for which it is intended it is an efficient implement. The large acreage which can be covered in a day, the perfect distribution, and, more especially, the ability to deal with small quantities of nitrates or other substances, either in a solid or liquid state, stamp this machine as one worthy of the Jubilee year of the Society.

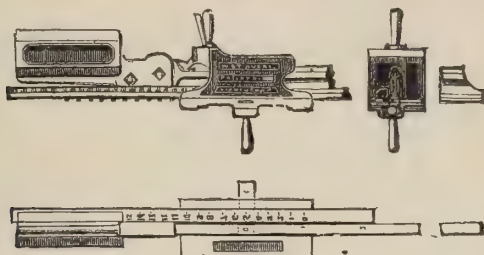
Messrs. W. & T. Avery, of Birmingham, received a Silver Medal for their Steelyard registering gross and tare. This is a simple arrangement (readily adapted to any platform machine) by which both the gross and tare weight can be clearly recorded upon a ticket inserted in a small slot on the side. A number of raised figures of hardened steel are fixed on the underside of the steelyard, corresponding with the various divisions or notches. When the articles to be weighed are placed upon the platform, the slide is moved along until it reaches the nearest division, when the small bar which slides through this slide, and has figures

also corresponding with its divisions, is moved until the beam attains a true balance. The ticket being inserted in a small slot in the larger slide, a handle underneath is pulled, and the card pressed against the figures, which mark upon it the weight, thus:—

Tons	Cwts.	Qrs.	Lbs.	PATENT SELF-REGISTERING WEIGHBRIDGE (Chameroy's Patent, Paris). W. & T. AVERY, BIRMINGHAM, Sole Makers.	
17	13	2	14	Gross	.
3	5	1	14	Tare	.
				Net	:

One of the principal advantages of this is, that as the machine itself records the weight upon the ticket, all mistakes

Fig. 6.—Avery's Steelyard.



in reading the weight are entirely prevented, and duplicate or triplicate records can be taken of the weight at the time of weighing. The cattle weighbridge to which this steelyard was fitted (Art. 3348) was one of Messrs. Avery's well-known self-contained machines, suitable for markets and fairs, with a cast-iron frame, with platform 12 feet by 9 feet, fitted with strong wrought-iron pen for weighing cattle, which is removable for weighing waggon, &c.

Messrs. Henry Pooley & Son, of Liverpool, received a Silver Medal for their Patent Self-contained Weighbridge (Art. 3362), the chief features of which are that it is a self-contained road waggon weighbridge; having the main underneath levers suspended from a structure composed of girders united at the angles in a novel way, so as to guard against irregular settlements even in defective foundations. The walls of the pit are virtually of cast-iron. The under levers are two only, having their knife-edged centres arranged in parallel planes. They are freely suspended in links which are "dirt guarded," to prevent mud and

road washings choking the centres and bearings, and as they move in the direction of the traffic, friction is reduced to a minimum. The main lever is arranged diagonally, and extends to a small lock-up timber shed or lean-to in which the indicator is placed, thus dispensing with the usual office. The indicator is novel; it is without loose weights, and its readings are clear and distinct. But, in addition to the usual readings, the poise or sliding weight contains within it a carefully calculated train of wheels, gearing into one another, and driven by an accurately cut pinion as a first driver, which gears into a rack secured to one side of the steelyard. The train of wheels drives a series of discs, having their peripheries prepared with figures representing tons, cwts., qrs., and lbs., and as these are revolved by the travel of the sliding weight, the necessary combinations of figures, corresponding to the weights indicated, present themselves with each weighing. A ticket placed within the ticket aperture is pressed by a small lever against the figures, the result being a record of the weight in black figures:—

POOLEY'S PATENT WEIGHT-PRINTING MACHINE.

Tons	Cwts.	Qrs.	Lbs.		Name
3	5	2	4	Gross	Address
2	0	2	4	Tare	Goods
				Net	Date

A novelty in the arrangement is a neat device for printing, in proper columns of figures, the tare underneath the gross weight. This is accomplished by a simple movement from left to right of the ticket box. In addition to its being a road waggon weighbridge, the plate is furnished with a thoroughly substantial cattle pen, formed of forgings, which, when dropped into sockets cast with the plate, act as "newel posts." To these strong hurdles and gates are hung, the whole forming a substantial cattle pen, capable of being erected or taken down in a few minutes. The weighbridge thus becomes either a perfect road waggon machine or a perfect cattle weigher at will. When the pen is in use, a counter-weight is provided by which it is accurately balanced.

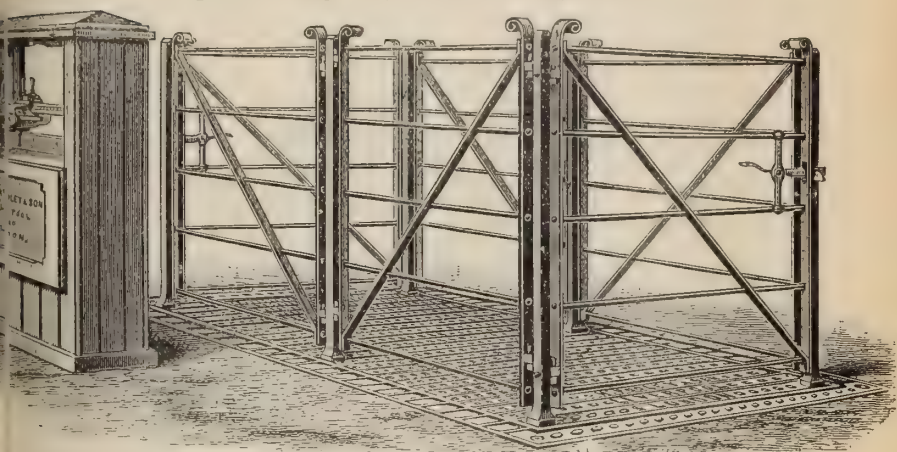
A considerable impetus was given to the manufacture of weighing machines, specially adapted for live-stock, by the passing, in 1887, of the Markets and Fairs (Weighing of Cattle) Act, which renders compulsory the placing of a weighbridge in all public auction marts.

Strange to say, there was no competition for the prizes

offered at Newcastle in 1887 for this class of machine by the Royal Agricultural Society, and the only two prizes given were awarded to Messrs. David Hart & Co., of City Road, London (who exhibited an excellent collection of their machines at Windsor). There is, no doubt, a growing tendency on the part of many leading agriculturists to use the weighing machine as a means of testing the growth and improvement of their stock, and also to assist them in estimating their value; and some also advocate and adopt the sale of stock by live-weight as the most equitable basis.

In connection with this subject it is interesting to note that

Fig. 7.—Pooley's Self-contained Weighbridge.



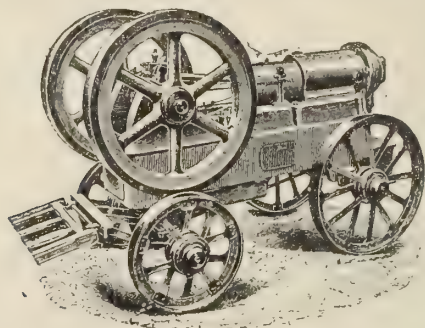
in the list of donations of books to the Library of the Royal Agricultural Society, in Vol. I., there appears "*The Grazier's Manual*, being tables showing, on new principles, the nett profitable weight of neat-cattle, calves, sheep, and swine: by Layton Cooke, land and timber surveyor, London, 1819." And in Vol. III. we find an article, dated 1842, by C. Hillyard, of Thorpeland, Northampton, entitled, "On Measuring Cattle," in which the writer says:—"About five-and-thirty years ago I met with tables for the measurement of cattle. In 1814 I printed my tables in a small book. The late Dr. Wollaston saw this book, formed his own calculations, and made for Lord Spencer a sliding rule, showing the weight in stones." The recent agitation in the same direction has tended to create a demand which the manufacturers have readily responded to, and the result was seen at Windsor in the splendid collection of

weighbridges of all descriptions exhibited there. We have now machines that not only weigh with the greatest nicety the most ponderous weights, but also faithfully record the weight upon the ticket in clear figures.

Messrs. Priestman Brothers, Hull, exhibited a 6 horse-power petroleum portable engine (Art. 5209), the principle of which is similar to the horizontal engine exhibited by them last year, and fully described in Part I. of the present volume (page 94).

The modifications necessary to adapt it to a portable form, and the improvements in detail since last year, were sufficient to warrant its being treated as a new implement. The engine is mounted on a cast-iron bed-plate of special construction,

Fig. 8.—*Petroleum Portable Engine.*



underneath which, at about the middle of its length, is the petroleum reservoir, vaporizer, &c. The water-circulating pump is bracketed on to one side of the bed-plate, and is worked from an eccentric on the crank-shaft. The air-pump is fixed in a convenient chamber under the forward end of the bed-plate, and is easily accessible. On this particular engine there are two fly-wheels with turned faces, from either of which a belt might be driven. The bed-plate is carried on wheels and axles, precisely in a similar manner to the ordinary portable engine, with the fore-carriage pivoted under the crank-shaft end of engine. The whole arrangement is very compact, while all parts are easy of access, fulfilling all the requirements of a portable engine for farm purposes. Its weight is 65 cwts. The firing is, as before, effected by electricity, either by means of a current from a primary battery or from an accumulator. This latter, when charged, will last for about ten weeks, and when recharging is required, this may be done at a small cost.

A brake trial of the engine was made, when the following results were obtained as compared with last year's engine:—

	Windsor.	Nottingham
Duration of trial	3·83 hrs.	2 hrs.
Mean number revolutions per minute	155·5	165·5
Mean effective load on brake wheel	114·6 lbs.	56·33
Effective diameter of brake wheel	3·8 ft.	5 ft.
Brake horse-power	6·38	4·48
Petroleum consumed during trial	34·88 lbs.	15·5 lbs.
„ „ per brake horse-power	1·42 lbs.	1·73 lbs.

It will be noted at once that the consumption of petroleum per horse-power is less than at Nottingham, owing to the more perfect combustion in the cylinder, the exhaust being quite clean and colourless. The uniformity of speed and the governing are very much improved. The maximum variation in speed during the above trial was from 154 to 157 revolutions per minute, which is very satisfactory. The price of petroleum is 6*d.* per gallon (the credit allowance for the cask may be taken as a set-off against carriage), the cost of petroleum per brake horse-power per hour being therefore 1·06*d.* as against 1½*d.* at Nottingham. Of course, comparing the cost of fuel alone, in a petroleum engine and a steam engine, such comparison is unfavourable to the former. There are, however, other very important considerations. The petroleum engine, once started, requires little or no attention, there being no fire to keep up; consequently the man is free to attend to other work. There is certainly less risk of fire, there being no sparks or unquenched ashes, and with a dense oil, such as used in this engine, there is no risk. But where a petroleum engine would actually come out cheaper in fuel consumption than a steam engine is in those cases where the engine is only used intermittently for a short time, there being no loss of fuel consumption in getting up steam, or waste of unconsumed fire at the end of the run.

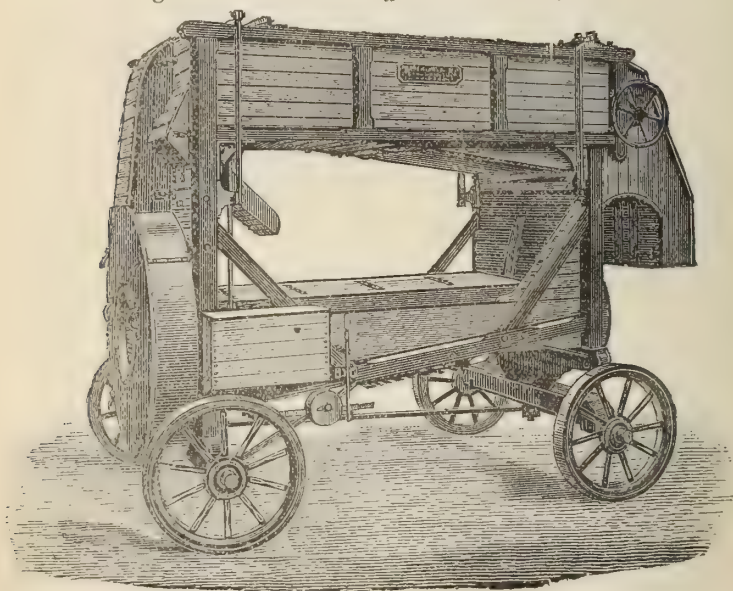
A second trial of this engine was made, running for five hours, at the same power and speed as before, but with the circulating pump connected up to a water cart, as would probably be the case when used as a portable engine on a farm. The capacity of the water cart was 450 gallons, the temperature of the water when first noted being 90° F., and five hours later 140° F. A tank of moderate dimensions will therefore serve to supply sufficient circulating water for some hours' work, without the addition of any fresh water. This in many cases would be a matter of very great convenience. The principal advantage claimed for these engines is that the motive power is obtained from the common petroleum of commerce, and not petroleum spirit, such as

benzoline, &c., the former being perfectly safe, while the latter will fire at ordinary temperatures.

The portable engine exhibited this year has been specially designed and introduced for farm and agricultural purposes, where the portable steam engine has hitherto been the only available motive power. The oil engine has a special advantage where coal is difficult to obtain, as the oil is always easily procured, being sold in almost every village, and would therefore often be of great advantage to many farmers and others in the country. The absence of sparks and hot ashes constitutes a great advantage when working in a farmyard. No driver being required, as in the case of a steam engine, the saving in wages covers the cost of oil consumed in an engine of the size referred to, making the cost of working exceptionally low.

Messrs. Marshall, Sons & Co., of Gainsborough. Portable Chaff-cutting, Riddling, Sifting, and Bagging Machine. (Art. 5304.)—This chaff-cutter is arranged to convert the straw into

Fig. 9.—*Marshall's Chaff Cutter and Sifter.*

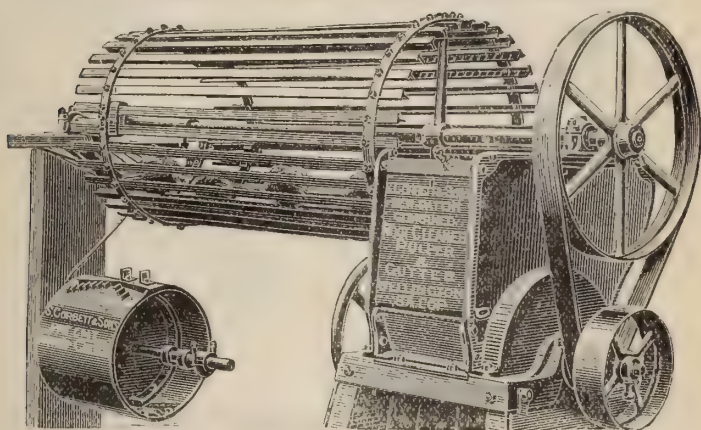


chaff, as it leaves the shakers of a thrashing machine. It is fitted with a knife-wheel carrying five knives, and is mounted on four travelling wheels with shafts. It was driven from a thrashing machine, but it can be driven direct from portable,

vertical, or other engines, if desired. The novelty of this cutter is the overhead sifting arrangement, which dispenses with the necessity of an elevator for bagging, the chopped straw, &c., being delivered direct into sacks from the sifter, and the seeds are delivered into a separate sack by the side of the chopped straw, &c., at the end of the cutter, over the driving pulley. The cavings are delivered at the opposite end of the cutter, over the knife-wheel, and can be easily delivered direct into the feeding-box, and recut or delivered on to the floor. The machine is so arranged that an extra fan can be attached for delivering the chopped straw, or cut chaff, into a distant or elevated chamber at any angle that may be required, by having an adjustable spout. The overhead sifter seems to be a great improvement, and the separation of chaff, cavings, and seeds very complete and satisfactory.

Messrs. S. Corbett & Son, Wellington, Shropshire. Combined Turnip Cleaner and Slicer. (Art. 5494.)—This machine is

Fig. 10.—Corbett's Combined Turnip Cleaner and Slicer.



intended to clean and slice, or cut, the roots at one operation. It consists of a revolving cylinder, 5 feet 8 inches long and 2 feet 5 inches in diameter, of T section wrought-iron.

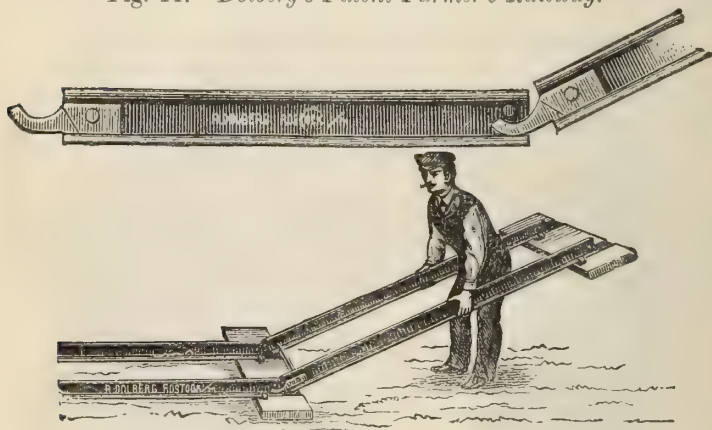
The roots are thrown in at the upper end, and turn over and over as they roll down the cylinder, and thus all dirt and stones are knocked off them. By letting the front plate of the cutter fall back against the barrel, the machine can be used for cleaning the roots if they are not required to be cut. The knives are double-edged, and can be reversed in the cutter. They are easily removed and replaced, and can readily be adjusted to cut

$\frac{5}{8}$ -inch fingers for sheep, or double the size for cattle, or to slice the full size of the roots. A plate at the end of the machine lifts out to give access to the inside of the barrel. The barrel is easily removed, the lower brasses being held in their places by a clip, which only requires to be unscrewed to release the brasses, and the barrel falls down.

The root cleaner was strong and well made. It appeared calculated to clean the roots properly, and thus facilitate one of the most tedious operations upon a farm. The cutter, or slicer, was simple in construction, and easily changed by any farm labourer, either to cut for sheep or cattle, or to slice, as required. The combined machine appeared in every way thoroughly practical and useful.

William A. Stone, Prague, Austria. Dolberg's Patent Farmer's Railway : Rising Switches. (Art. 7210.)—This is a contrivance for enabling a turn-out to be made from a main line

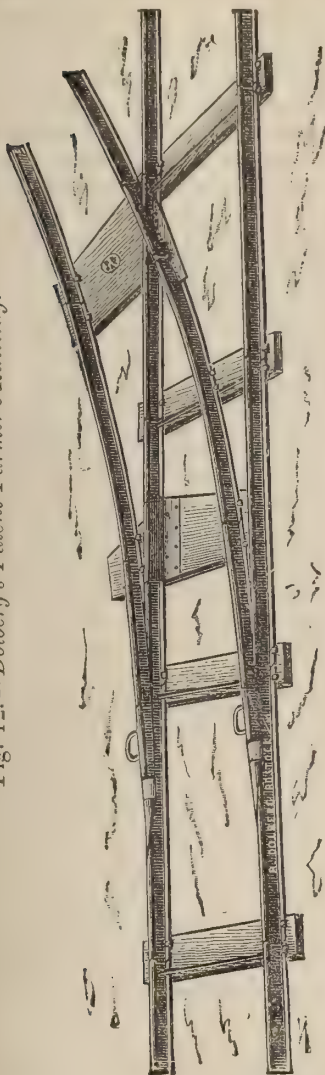
Fig. 11.—*Dolberg's Patent Farmer's Railway.*



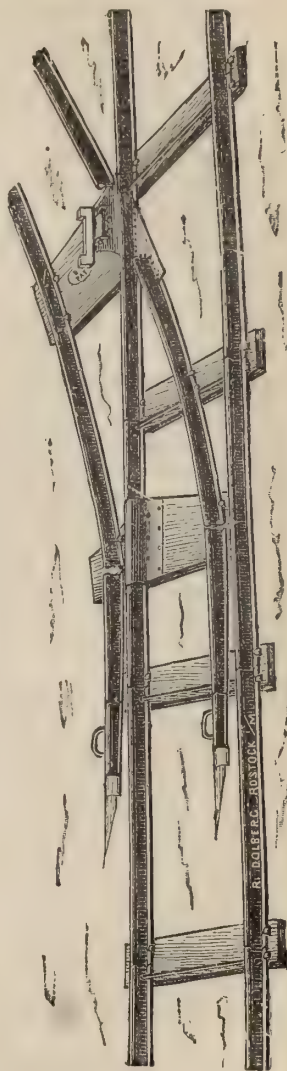
without interfering with the rails. It consists of a pair of points the extreme ends of which are hinged to pieces of ordinary rail by rule joints. The hinged points are made to lie on the top of and to embrace the main rails on which they are laid, and are provided with substantial lateral handles turned the same way for lifting them on and off. The butt ends of the tongues are provided with pivot pins attached to their sides, and turned downwards so as to enter holes in a plate sleeper about 10 inches wide, $\frac{3}{16}$ -inch thick, stiffened by angle irons, and channelled transversely so as to hang over the main rail which is being crossed, and to hook on to the other rail which is being left to one side. This plate has riveted to it a short pair of rails which extend as

far as the crossing, and are then riveted to a taper plate a foot wide at the broader end and 8 inches at the other by $\frac{3}{16}$ -inch

Fig. 12.—Dolberg's Patent Farmer's Railway.



Rising Switch, side line open.



Rising Switch, main line open.

thick, which is channelled to hang over the rail that is being crossed. The junction between the two ends of the sliding rails is made by a piece of square iron 1 inch in the side, about

14 inches long, the ends of which are turned sharply down to rest on the plate over the main rail, and which is attached to a hinge, by means of which it can be turned off to one side when it is desired to leave the main line open. To the opposite side of the plate are attached short pieces of rail secured at their outer ends to a plate sleeper, which forms the junction to the continuation of the line. The effect of this arrangement is that the siding rises and crosses over the main line so that the switch can be applied anywhere, and by simply moving the tongues and the crossing bar, leave the main line free. The whole is so light that a couple of men can fit the points and remove them in a few minutes. The wheels of the rolling stock are double flanged, which effectually secures the safe working of the arrangement. The rails are of the ordinary flat-footed kind, $2\frac{3}{4}$ inches high, 2 inches wide at the foot, and 1 inch at the head.

The special feature of the portable railway to which this switch is adapted, figs. 11 and 12, lies in the fact that it can be immediately laid across the most uneven ground. Each section consists of two steel rails, which are fastened at one end to a wooden or steel sleeper, in such manner that about one-third of the sleeper is left free to act as a support for the next set of rails. As the ends of the rails which rest on the sleeper have two steel studs riveted on the outside of the web, the steel hooks of the next set of rails engage with the steel studs of the preceding set of rails (as shown in fig. 11), and as soon as the rail is lowered to the ground form a longitudinal connection without any bolts or nuts.

The chief advantage of this joint is that, owing to its flexibility, it adapts itself to the most uneven ground, each set of rails being really only the long link of a chain. In fact, the variation of the level of each set of rails on very rough ground is so great that it has been found necessary to fit the trucks with double-flanged wheels, as it frequently happens that only three wheels are resting on the rails. During the two years that this system has been patented in Germany, a great number of estate owners there, and in Austria, have adopted this railway for farm work, for taking the manure out into the fields, and bringing the produce to the farmyard, sugar factory, or distillery, as the case may be.

III. STEAM ENGINES.

It is remarkable how generally the system of regulating the speed of engines by means of an ordinary governor shifting a block connected with the expansion slide in a curved rocking

link has been adopted, no less than seventeen engines; most of them compound, being so fitted. Among the more noticeable of these is the arrangement adopted by *Messrs. Clayton & Shuttleworth* (Art. 4978) for getting over a certain amount of hunting on the block which commonly takes place. In the top of the central weight of the governor is a glass-lined cylinder about 3 inches diameter and 4 inches deep. The spindle of the governor passes through this, and is fitted with a piston packed with a single ring, and a small air hole is provided to allow of the escape of some air. As the counterweight works up and down, the air between the piston and the bottom of the cylinder is compressed or exhausted, and so checks the rapidity of movement, while the small hole and the leakage along the governor spindle and the piston allow the air to assume its normal state when the counterweight is at rest, at any position due to the speed.

Messrs. Hornsby (Art. 5063) attain the same end by causing the governor to act by means of a short lever on a rocking shaft, on to one end of which is keyed an eccentric about 7 inches diameter; the eccentric strap is in one piece cut through at one side, the ends being held together by lugs and a bolt, so that the degree of tightness can be adjusted. The eccentric strap actuates the sliding block connected with the expansion slide, and the friction of the strap on the large sheave serves to damp the energy of the oscillations.

Messrs. Ransomes, Sims & Jefferies showed a Sixteen Horse-power Horizontal Engine with Special Expansion Gear. (Art. 4997.)—This engine has a cylinder 13 inches diameter by 2 feet stroke, which actuates a crank shaft in the usual manner. The valve gear is, however, peculiar, and deserves attention. The steam admission valves, which are of the double beat kind, are at each end of the top of the cylinder, arranged so as to leave as little clearance space as possible. The exhaust-valves, which are of the cylindrical slide variety, are at the bottom, with their axes at right angles to the cylinder, and worked by a special eccentric on the crank shaft in the usual manner. The steam-valves are lifted by means of levers having fulcra nearer to each other than the two valves. The outer ends of the two levers grip the valve-spindles through cross heads, the position of which on the spindles can be adjusted by means of nuts fitting on to screws cut on the spindles, and the valves are further contracted by spiral springs coiled on the spindles and abutting against a cross bar, which is secured to a central bracket and extends over both valves. The tail ends of the levers are turned to each other, and almost abut against

a rocking-shaft, vibrating at right angles to the cylinder and having its bearing in the central bracket already mentioned.

This rocking-shaft is armed with a T head immediately over the tails of the valve-levers, so that as the shaft rocks one or other of the levers is depressed. The outer end of the rocking-shaft is fitted with a lever, turned downwards, the length of which can be varied by screwing its eye end more or less into the end on the shaft, and securing it in any position by a lock nut; it is moved by a connecting rod and second rocking-shaft, the outer lever of which is actuated by Proell motion. This consists of an eccentric keyed on to the crank shaft, and a wide strap, the position of which on the sheave is determined by a short eccentric rod, actuated by an eccentric formed on a rocking-lever placed a little below and to the rear of the crank shaft.

The eccentric sheave is provided with a cylindrical slide almost tangential to the sheave, but a good deal to one side, and along this slide the head of the connecting rod actuating the valve-lever slides up and down under the influence of the governor, which causes the lower rocking-shaft described above to vibrate, and, through a short vertical connecting rod attached to one of its levers, to cause the connecting rod to follow, the eccentric sheave being shifted at the same time by the eccentric movement already described. The combination of these two motions on the valves is such that they open at the same portion of the stroke, no matter what the degree of expansion may be, and they close at any period that may be necessary to admit sufficient steam to do the work, the governor regulating the point of cut-off automatically.

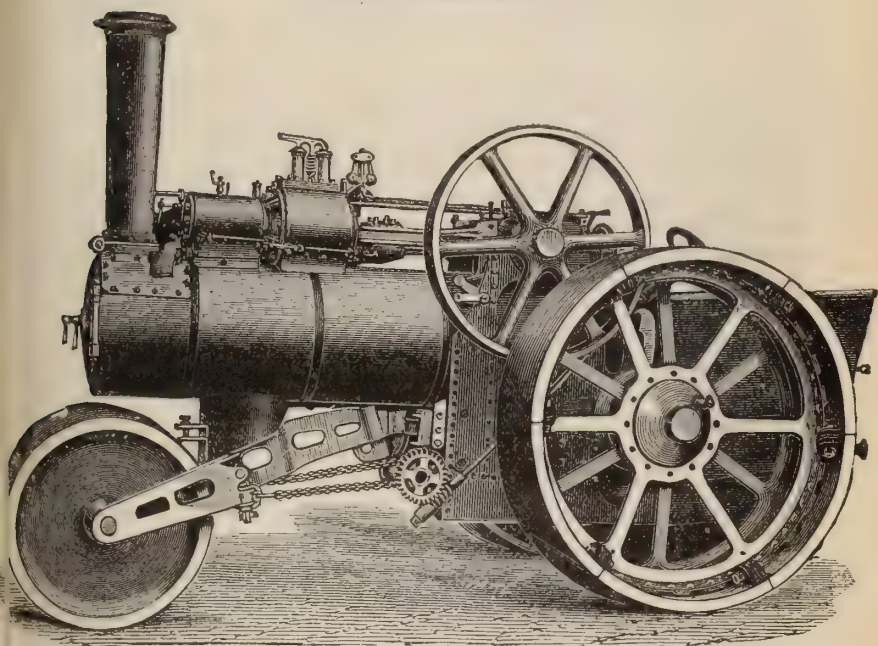
The governor is on Proell's system, and is of the inverted ball type, with a spring fulcrum concealed in the central counterweight. The engine works under 80 lbs. steam, will cut-off from 0 to $\frac{1}{2}$ stroke, and runs at 90 revolutions, indicating at $\frac{1}{2}$ cut-off about 48 horse-power.

Messrs. Eddington & Steevenson, of Chelmsford, exhibited a traction engine of 8 horse-power, together with road roller attachments suitable for fixing to any action or ploughing engines. (Arts. 5588-5589.)

In the traction engine there were several special features deserving notice. For the power of the engine its width and weight were reduced considerably below the prevailing practice, the over-all width being 5 feet 11 inches, and weight 5 tons empty; the construction of the main wheels, which were 5 feet 6 inches diameter by 1 foot $2\frac{1}{2}$ inches wide, was good; and, so far as could be judged merely from examination, the spring mounting of the driving wheels seemed likely to accomplish all

that was claimed for them. Nothing short of a practical test will, however, decide upon the merits of the various systems or spring mountings for traction engines, and such a trial would prove very interesting, as the application of springs was not in vogue at the period (Wolverhampton Show) when the Society held its trials of traction engines. The valve gear of this engine differed entirely from the ordinary practice, the eccentric rod and slide-valve being superseded by tappet valves actuated by

Fig. 13.—*Eddington & Steevenson's Traction Engine, with Roller Attachments.*



cams on a revolving spindle, the precise position of the cams and consequent lift of the valves being automatically regulated by the governor. The gearing was arranged so that there should be as little overhanging strain on the crank-shaft as possible, and three different rates of speed were provided for, viz., 4 miles, $2\frac{3}{4}$ miles, and $1\frac{1}{4}$ mile per hour. This engine certainly presented many new combinations, which bore testimony to the spirit and enterprise of the makers, and it would have been extremely desirable to have tested the engine practically, had it been possible to do so without entering into what ought to be a competitive trial of the various engines of this class,

The roller attachment (Art. 5589) doubtless commands more attention than the several points of novelty briefly indicated in the traction engine, for at a very small cost almost any traction or ploughing engine may be converted into a road roller. This is no unimportant consideration when it is borne in mind—first, that there are many districts which would gladly have their roads made and rolled by a steam roller, but which cannot afford to invest in such expensive plant as a steam road roller, which can only be used for such purpose; secondly, there are hundreds of traction or ploughing engines throughout the country which are standing idle just during that time of year when the work of road rolling might most efficiently be carried out.

It is clear, therefore, that if some of the traction engines which now stand idle during parts of the year were fitted with the roller attachment, they would be not only available, but in demand, for the rolling of the roads in their surrounding districts, to the advantage greatly of the owners of vehicles, who will probably before long become aware that the most expensive way of rolling our roads is that in vogue at the present time in many places, viz., using carriages and carts for the purpose.

The attachment simply consists first of a roller with a frame which carries the pivot of the fore carriage of the engine, the ordinary steering chains being attached to this frame on either side of the roller. The frame is carried back towards the fire-box underneath the boiler, a channel iron guide is riveted on to the fire-box, and in this guide the prolongation of the frame carrying the roller works. It is only necessary to have this guide attached to the fire-box underneath the boiler, to remove the fore carriage of the engine and substitute the roller, and, so far as the fore part of the engine is concerned, it is at once converted into a road roller. As for the two hind wheels, all that has to be done with them is to bolt segmental smooth plates round the periphery of the wheels.

This attachment certainly appears to meet a distinct want, and it is only to be regretted that such an appliance should have been sent into a show-yard without having had it fitted on to the particular engine it was supposed to suit. The result was that the Judges were unable to see it actually applied, and consequently, from a trifling error in workmanship, could not take such notice of it as otherwise they might have done.

Messrs. J. & H. McLaren, Leeds, showed a compound semi-portable engine with the cylinders over the boiler at the chimney end, and fitted with Hartnell & Turner's expansion motion. (Art. 5951.)

The peculiarity of the arrangement is that the engine proper is quite self-contained and independent of the boiler, so that it can be detached and used as a separate engine. The boiler is provided with wrought-iron brackets securely riveted on, and of sufficient breadth for the engine to stand in either direction. The cylinders are $6\frac{1}{2}$ inches and 10 inches diameter, and 12 inches stroke; the jackets are formed by ribbed liners forced into outer cases, the ribs adding very materially to the power of the liner to transmit the heat of the jacket steam to the inside surface of the cylinders. The steam connection between the cylinder cases and the boiler is formed by means of a boss riveted to the boiler and adjusted so that the cylinder case can be bolted to it. There is a boss under each cylinder bracket, but one only is in use at a time, the opposite one being covered by a blank flange. Steam passes in between the cylinders, and, rising up, enters the jacket space by holes near the top, thus preventing any priming from getting in. The condensed water drains away by a 1-inch pipe into the water space of the boiler. The steam ports of the cylinders are on their sides; those of the high-pressure engine are symmetrical with the cylinder, but those of the low-pressure cylinder are placed below the centre so as to drain the cylinders completely by gravitation, the exhaust port being lower even than the two steam ones. The exhaust pipe is arranged to connect either laterally below the steam chest, or at either end, so that the cylinders can be worked in any position. The high-pressure slide-valve has a passage through it which serves to give additional admission to the steam, and so to insure full pressure in the cylinder at the commencement of the stroke.

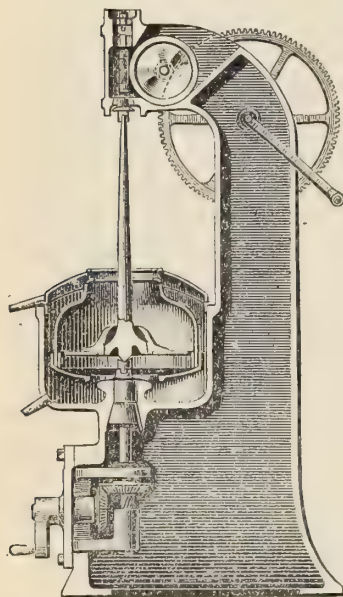
The cylinders are connected to the crank shaft-bearings by hollow frames, in which are formed the crosshead slides. The crank-shaft bearing brasses are parted vertically and set up by wedges and screws. The feed heater is placed under the boiler and extends from the fire-box to beyond the smoke-box; it is composed of a rectangular cast-iron case fitted with six 1-inch tubes, through which the feed water circulates, and round which the exhaust steam plays, entering near the fire-box end and issuing by a vertical blast pipe into the chimney. The feed water passes six times backwards and forwards through the tubes, which are secured in the tube plates by means of small glands and rubber packings very like those used for glass gauges; the glands also form caps for closing the holes corresponding to the tubes in the outer case, and thus afford good access for cleaning the tubes. The water is said to be heated to over 200° Fahr. The engine is intended to work at 140 lbs.

pressure, running at 150 revolutions per minute, and Mr. McLaren stated that the steam consumption was between 17 and 18 lbs. per brake horse-power per hour. The engine is of a strong, serviceable pattern, and will, no doubt, make its way.

IV. DAIRY IMPLEMENTS.

The Aylesbury Dairy Company, Lim., showed a "Star" Hand Separator (Art. 1482), which differs from most of the hand

Fig. 14.—"Star" Hand Separator.



separators in that (1) the driving gear is fixed to the top part of the frame of the machine. (2) The drum, which is approximately spherical in form, is of considerable size and weight. (3) The speed arranged for rotating the handle is much slower than usual.

All the moving parts are very well balanced, and although the machine may as a consequence of (2) and (3) be a little heavier in starting, it has for the same reason the advantage of maintaining its speed for a considerable time, as evidenced in the trial made by its taking 15 minutes to come to rest: this enables an attendant to leave the machine for a few moments, if necessary, either to move or replace cans, &c.

The driving gear of the machine is in the top part of the frame, and consists of an arrangement of spur or wheels, which, by means of a handle, rotates a vertical spindle. This spindle has in its lower end a recess socket, which is lined with an india-rubber bush; into this socket the upper end of the drum spindle is introduced and rotated by the cross-pin in the end of the spindle fitting into slots or notches in the socket of the top vertical spindle. The drum spindle on which the drum is fitted simply by a cone rests with its male centre in the female centre on the screwed spindle. This spindle can be lowered and raised by the action of a handle and mitre wheels, thereby allowing the drum spindle and drum to be fixed in the machine or removed therefrom.

The tendency of the drum spindle when driven will always be to find its exact vertical position, and the drum and spindle will rotate like a spinning top on its true centre; the upper end of the spindle is allowed to find its own position in the socket of the top spindle by reason of the elastic bush.

This mode of driving creates no vibration, therefore the machine requires no fixing whatever, if it is set level.

The drum has a partly spherical form, with a neck on the top, and is open at the bottom. Inside the drum a diaphragm is formed with a conical opening in the centre to fix it on the drum spindle. This diaphragm has holes round the periphery, forming communications between the upper and lower compartments. When the milk is fed into the drum through the feed cup in the centre, the separated cream ascends and runs off at the top into a circular cover, and the skim milk, passing into the lower compartment, runs off through the opening in the bottom into the fixed receiver in which the drum rotates.

The Judges tried this Separator somewhat under difficulties. Owing to the time taken up by the other trials at the Dairy, they were not able to try it there, but had to remove it to the stand of the Aylesbury Dairy Company, where it was worked on the morning of June 27, with the following result:—

	h. m.	
Started to get up speed with 11 revolutions of handle per minute	10	58
Turned on skim milk; speed 16 revolutions of handle per minute	11	5½
All milk in separator	11	12½
All cream out.	11	15
	lbs. ozs.	
Net weight of skim milk	44	14
" " cream	5	8½
	50	6½

From the time the operator ceased working the machine until it actually came to rest was 15 minutes 25 seconds, during the earlier part of which time separation was taking place.

Dr. Voelcker reported on the milk as follows:—

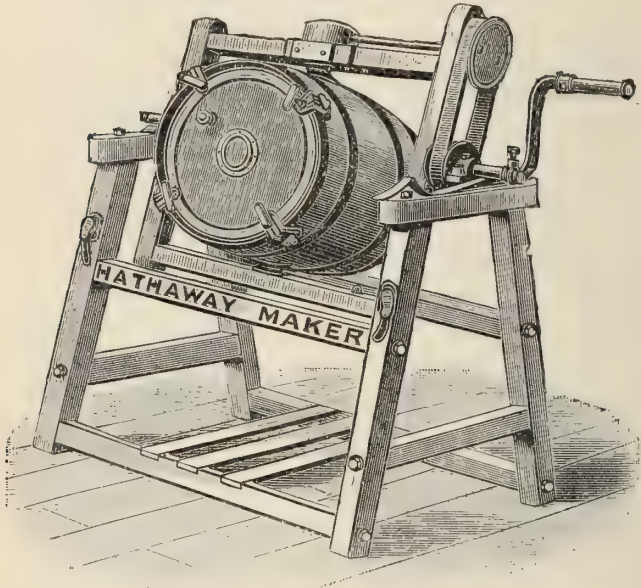
Whole Milk	{ Total solids	. . . . .	13.23 per cent.
	{ Butter-fat	. . . . .	4.35 "
Skim Milk	{ Total solids	. . . . .	9.84 "
	{ Butter-fat	. . . . .	0.15 "

This Separator, from its simplicity and the ease with which it was worked when it had attained its speed, commended itself favourably to the Judges, and they would like to have given it a more extended and comprehensive trial, but as they were not able to do this, they decided to recommend that it may be exhibited (under Rule 5) as a new implement at the Plymouth Meeting of the Society, and classified as an exhibit for special inspection.

Mr. George Hathaway, of Chippenham, exhibited a churn (Art. 1541) with a very peculiar motion. He calls it The Universal Churn, from the universal motion that is given to it. It

is a simple end-over-end churn, hung on spindles in a rectangular frame, within which it revolves in a horizontal or vertical position, but it has also an eccentric motion given to it by two bevil wheels, worked by a pulley and strap, from another pulley on the main spindle. Mr. Hathaway says that the cream in some churns is not thoroughly rotated and mixed. It would seem quite impossible for any cream to escape the most thorough

Fig. 15.—*Hathaway's Universal Churn.*



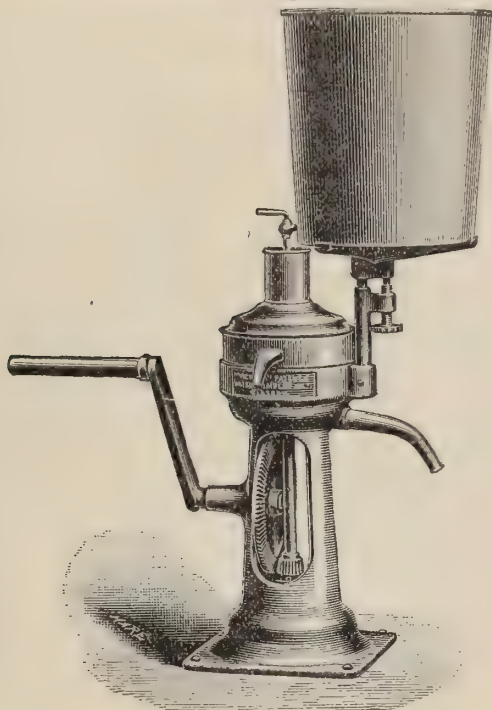
tossing and rolling in this churn; altogether the idea is very smart and ingenious.

Messrs. Freeth & Pocock exhibited in the Dairy their Hand Cream Separator, "Victoria" (Art. 1904), which was generally similar to the large Separator exhibited by them at Nottingham in the same department of the Show. The drum is slightly modified since then.

It is conical in form, with two vertical ribs inside, with a clearance of about $\frac{1}{16}$ -inch between them and the bottom of the vessel. The vertical inner face of the ribs is grooved, and through the upper part of the rib there is a hole leading to the outside of the drum. The milk is fed in as usual at top, and travels down to the bottom; the cream ascends up the groove in the vertical ribs, and delivers through the hole

already referred to. The skim-milk delivers through holes near the outer edge of a false bottom in the drum, and delivers through the centre into the casing. The machine is very compact, and admirably suited to meet the needs of a small dairy. The gearing by which the speed is increased between the hand-wheel and the vertical spindle of the drum is an adaptation of the old Sun and Planet principle. In the vertical spindle teeth are cut, which engage in a gun-metal pinion, which also engages

Fig. 16.—*Hand Cream Separator, "The Victoria."*



in a similar gearing on the underneath side of the pinion into which the wheel on the spindle of the hand-wheel gears. The system works very smoothly and silently, the ratio of the gearing being 165·4 to 1; thus, working at 48 revolutions of the hand-wheel, the revolutions of the drum would be 7,939 per minute. The machine works equally well driven in either direction. A trial of the machine was made as under:—

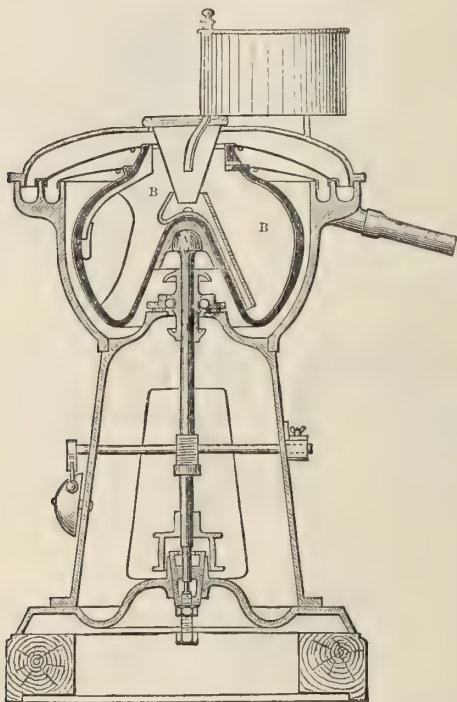
Milk served out	.	.	.	.	.	.	26·25 lbs.
Temperature	.	.	.	.	.	.	85°
Cream	.	.	.	.	.	.	2 lbs.
Time occupied	.	.	.	.	.	.	8 minutes

Dr. Voelcker gave the quality of milk as follows :—

<i>Original Milk</i>	{	Total solids	.	.	.	12.41	per cent.
		Fat	.	.	.	3.45	"
<i>Skim Milk</i>	{	Butter-fat	.	.	.	0.17	"
		Solids, total	.	.	.	9.88	"

Under the title of the Alexandra Separator, *Messrs. Lister & Co.*, of Dursley, Gloucestershire, exhibited a Separator (Art. 6010), introduced by *Messrs. Koefoed & Hauberg*, of Copen-

Fig. 17.—*The Alexandra Separator.*



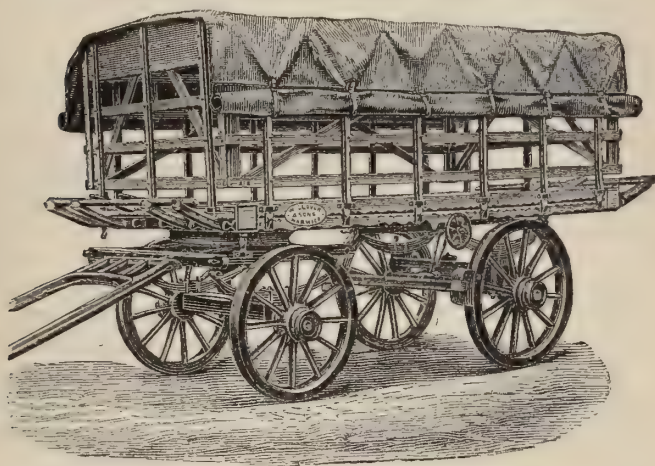
hagen. In general design and appearance it is very like the Laval Separator, the bowl being more or less spherical, and is made of cast-steel. The special feature claimed is its uniformity of speed, although driven by a motor, such as a horse-gear, which is not uniform in its speed. Where a horse-gear is used, this is of course an important consideration. A reference to the accompanying sectional elevation shows how this is achieved. The bowl "B" is quite separate from the spindle; it merely rests on an enlarged head "A" on the top of the

spindle. The bowl is turned up true and perfectly balanced, so that there is no vibration arising from its own motion. Should there be any irregularity of the speed of the spindle, the momentum of the bowl is sufficient to cause it to slip on the spindle, and to maintain practically a uniform velocity. The same end was achieved in the earlier Laval machines by making the vertical spindle in two lengths, the upper length which was attached to the bowl bearing on a toe step of cork formed in a socket on the lower part of the spindle. Some such compensating arrangement is certainly a "desideratum" either for hand machines—where the operator does not work quite uniformly—or, as already stated, where machines are driven by horse works.

V.—MISCELLANEOUS IMPLEMENTS.

Messrs. W. Glover & Sons, of Warwick (Art. 231), exhibited a Lorry for Farm-work. This combines to form a

Fig. 18.—*Lorry for Farm-work.*



waggon, harvest trolley, stock van, and cabbage waggon. It is mounted on springs, has double shafts and patent axles, with double break, and is estimated to carry 4 tons. Fifteen-inch boards are fitted all round, when required as a general purpose waggon; rather $3\frac{1}{2}$ feet deep, with a waterproof cover and curtains, are provided to form a road or rail van for sheep, calves, and pigs, and these are removed when required for cabbage, &c. Back and front ladders are used for hay and corn; when these are on a bed is formed 15 feet 6 inches by

6 feet 2 inches wide, and the whole only weighs 15 cwt., or 5 cwt. less than an ordinary farm waggon.

Messrs. George Lewis & Sons, Kingsland, Herefordshire, exhibited (Arts. 333 and 334) two strong, well-made waggons, fitted with screw-brake, "expansion" sides, with dashboards complete, the price of which appeared very moderate.

Messrs. Carling, Gill & Carling, of Guildford, exhibited a Rick Borer (Art. 486).—This is practically an auger for cutting a core out of stacks when overheated, to prevent damage or spontaneous combustion. The diameter of the auger is 8 inches, and it is made in 3-foot lengths, which are jointed together as necessary, according to the length required, by a set screw and socket, with a handle at upper end to turn it.

A Silver Medal was awarded so long ago as the first Derby Meeting in 1843 for a similar implement.

I have noticed this article because there have been an unusually large number of overheated stacks this season. It is useful to ventilate a stack, to *prevent* it becoming so compressed and hot as to be dangerous and cause damage to the hay; and, if used in time, it is very effective.

Mr. F. H. Brigg, of Bradford, Yorks, showed an Attachment for Increasing the Tractive Power of Horses (Art. 825), which may be applied to any description of two-axled vehicles. It is claimed that by its use part of the weight can be transferred from off the front wheels on to the draught animal's back whenever required, thus temporarily increasing its weight and consequently its tractive power, so much so as to enable one horse to draw nearly as much load as two horses could under ordinary circumstances, either on a rough, stony, soft, or slippery road, or in climbing hills. Mr. Brigg has evidently devoted much time to this question, and was most anxious that the Judges should make a trial of this exhibit, so that he could prove every claim he makes for it; but they were not able to do so, and cannot, therefore, express any opinion upon what is rather a complicated subject.

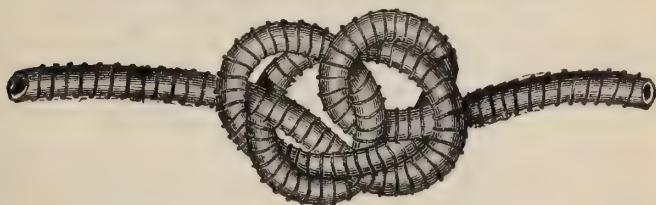
The Electric Carriage (Art. 1175), exhibited by *Messrs. Immisch & Co.*, of Malden Electric Works, Kentish Town, London, N.W., is a facsimile of the one supplied to His Majesty the Sultan of Turkey, and is constructed to carry four persons. The electric motor is an "Immisch" one horse-power machine, the power being transmitted to the carriage wheels through suitable gearing placed under the body of the vehicle. The energy which drives the motor is stored in thirty accumulators of the E.P.S. type, containing sufficient power to run the carriage at a speed of ten miles per hour. The steering arrangements are

extremely simple, and an ordinary foot-brake is also provided, which can be operated by the driver. A switch-box placed immediately in front of the driver enables the speed to be varied according to circumstances. The carriage was charged and was then tried by Sir Jacob Wilson and others, as well as by the Judges, in the Show-yard. It was easily managed and steered, but seemed, with a full complement of passengers, too heavy for the power available, and it would appear that the weight of the accumulators requires to be materially reduced in proportion to the power developed.

A new implement (Art. 1873) was exhibited in motion by Mr. J. C. Allsopp, of Nottingham. It was a vegetable and fruit-slicer. It slices cucumbers, apples, potatoes, French beans, and other vegetables very rapidly and well, and of any thickness required. It is simple and easy to work, and also to clean, which is a great point. It was evidently a great favourite, judging by the number of purchasers.

The Sphincter Grip Armoured Hose Company, of Fore Street, London, exhibited a selection of their Armoured Hose. (Art. 2240.) Under a patented process a steel wire is wound around

Fig. 19.—*Sphincter Grip Armoured Hose.*



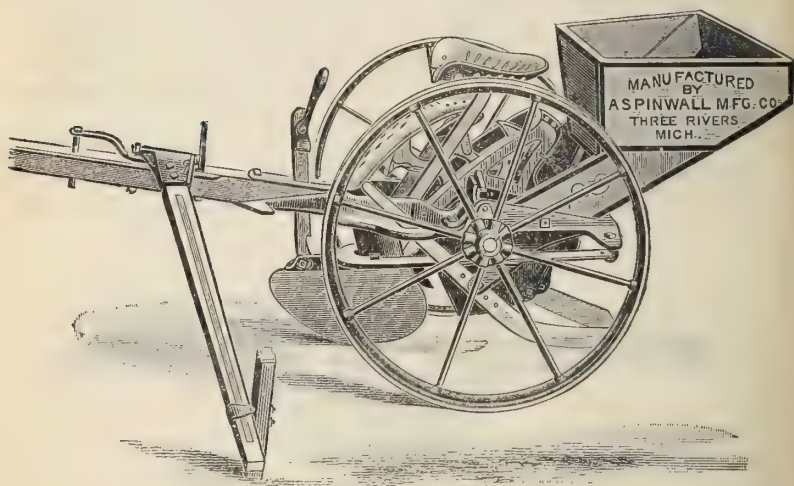
the hose with a perfect grip. It is claimed that this entirely prevents the hose kinking, although at the same time it remains perfectly flexible, that it prevents wear, and protects the hose of whatever material it may be made, in consequence of which it is claimed that sphincter hose will last considerably longer than other hose, and will stand much greater pressure of either steam, gas, water, or air. A special feature of this hose is that the wire, or armour, can be cut at any point without uncoiling.

Messrs. Lankester & Co., of Southwark Street, London, exhibited Aspinwall's Potato Planter. (Art. 2653.) The potatoes (either cut or whole) drop from the hopper by an automatic feed (which only allows them to drop as required) upon two concaves, and are caught up by a "picker," or two-pronged fork, which in turn comes in contact with a "tripper," or finger, which forces the potato off the points and drops it into

the furrow previously made by the steel-coulter attached to the machine. The furrow is then closed by the "coverers," and the potatoes left at one uniform depth, which can be regulated at will, and the distance apart can be varied. The driver can from his seat control the machine thoroughly.

The Judges did not try this machine, as they considered that they could not do so properly unless the land had been previously thoroughly pulverised. They tried it on the grass to drop the potatoes, and this it did with regularity and without injury to the sets, and it appeared as if it would, with land

Fig. 20.—*Aspinwall's Potato Planter.*



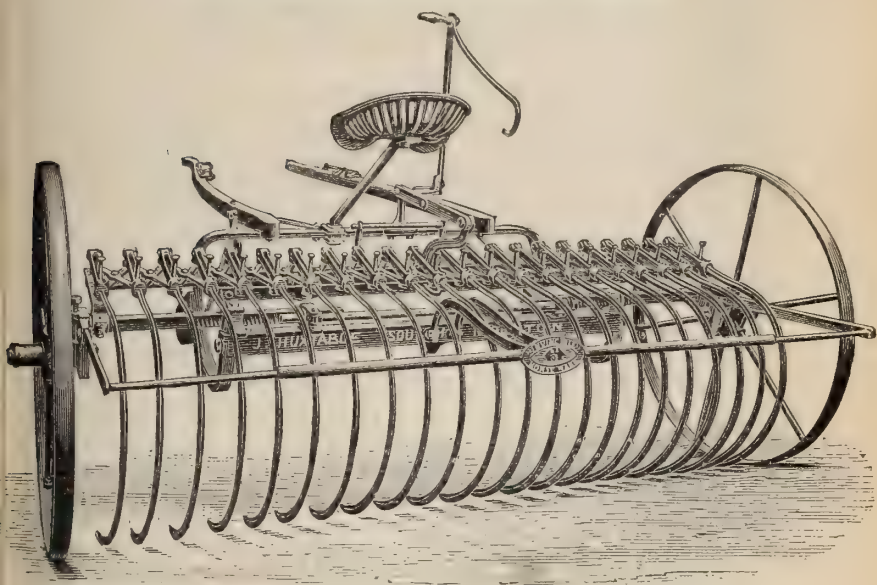
thoroughly prepared, do what was claimed for it. There can be little question that an implement which shall by one operation thoroughly and efficiently strike out the furrow, plant the potato, and cover it, would very considerably reduce the labour, and be much used in the districts (every day increasing) where large quantities of potatoes are grown.

Messrs. Thos. Wood & Son, of Chester, exhibited (Art. 2871) a Stable Loose-Box, converted into stalls, consisting of pillar to slide into grooves, division doors, and two manger sets. This is an arrangement of fittings whereby a stable can be used either as a loose-box or two-stall stable. The footing of the pillar moves along in a groove, and is then fixed in position by an iron plate. It is easily and quickly converted, and seemed very firm.

Mr. A. H. Lapham, road surveyor, Chippenham, exhibited an implement (Art. 2888) for paring or trimming the sides of roads. This is very similar to an ordinary strong single-furrow wheel-plough, with two revolving steel discs, which run obliquely, but parallel, to each other. The body of the plough is also set obliquely, so as to give the required slope towards the cut edge, and the share clears about 6 inches, the "sidings" being deposited in a regular layer at the roadside. One man and a boy leading the horse are required, and would do a considerable distance in one day. An efficient implement of this description would no doubt save a very considerable sum annually to some of the County Councils, who will, it is hoped, require that the roads shall be better kept and more regularly "sided" than they have been in many places.

Mr. John Huxtable, of South Molton, Devonshire, exhibited a Patent Expanding Horse-Rake (Art. 3195), the axle of which

Fig. 21.—*Huxtable's Expanding Horse-Rake.*



is divided in the centre, one-half being attached to each wheel, but held together by clips in which it slides when the rake is being extended or closed. The teeth are hung on a frame similar to "lazy-tongs," and can be adjusted any width apart, from $2\frac{1}{2}$ inches to 5 inches, the rake also being capable of

expansion, from 7 feet to 10 feet wide. It is easily opened or closed by a handle which controls a screw-spindle. It is claimed that this makes it more convenient to move through narrow lanes, like those in Devonshire, or gateways, and that it is an advantage to be able to vary the width of the teeth according to the work required, whether for collecting hay or raking stubbles, when probably a wide tooth would be best, or for clearing a meadow the last time, when a fine tooth would be most suitable.

Messrs. Ben Reid & Co., Aberdeen, exhibited a Road Tracer, or Levelling Apparatus. (Art. 3238.)—This consists of a horizontal sight-tube, having a graduated scale marked on it, showing the gradients from 1 in 5 to 1 in 240, which is hung on a pivot, and swings freely to the perpendicular when the sliding-weight is set to the different gradients. It indicates at once the rise or fall of the ground at any distance as far as the eye can see. When taking levels the weight should move until the sight-tube is in line with the mark on a sight-rod; the figures on the plate then show the rise or fall. It cannot easily get out of order, as there are no spirit tubes to break or delicate parts to damage.

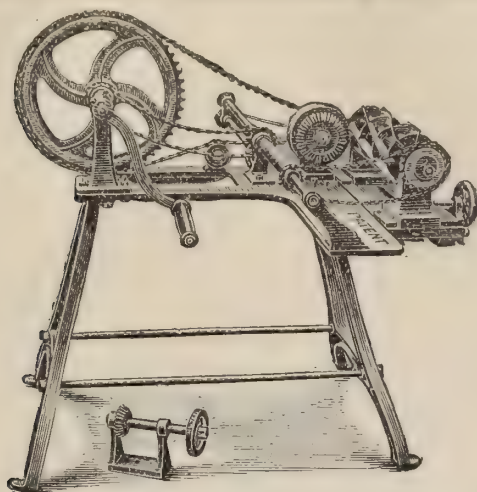
Messrs. J. R. Knapp & Co., of Faringdon, exhibited (Art. 3341) a small one-row drill, "The Collings," for hand use, fitted with reversible cup wheels and interchangeable cog-wheels, so that it can be varied to sow four different quantities of seed. The wheels can be regulated to any width of row, and it can be thrown out of gear at will. This is a well-made drill, at a reasonable price, and very suitable for filling up gaps in the rows of turnips—when they are extensive—on large farms.

One novelty of very general utility was exhibited by *Mr. A. J. Blew*, of Fawley Lodge, Hythe, Southampton (Articles 3970–72). It is a simple plan for releasing horses from the harness in case of accident, or otherwise. It is applicable to both double and single harness, and to all descriptions of vehicles. It is inexpensive, and can be fitted to existing vehicles. It is a very ingenious apparatus, not likely to get out of order, easily understood, and worked by any one.

Messrs. Cottrell & Co., Hungerford, Berks, exhibited an "Improved Lawn Mower Grinder" (Art. 4274), for grinding the spiral blades and sole plates of lawn mowers. The barrel of the lawn mower revolves on its own bearings in brackets fixed on a sliding table, and is driven against the face of an emery wheel revolving in a contrary direction, and at the same time the barrel moves backwards and forwards on a parallel slide against the emery wheel. The sole plate also is ground straight and

true edged, in the same manner as on a smaller emery wheel. The machine appeared simple and effective.

Fig. 22.—*Cottrell's Improved Lawn Mower Grinder.*



Mr. John Gregory, of Newcastle-on-Tyne, exhibited (Art. 4367) the Potato Raiser, which gained the first prize in the trials at Newcastle, in October 1887.

In the report upon that trial (Journal, Vol. XXIV. p. 222) it is fully described, and the following remark appended:—"The best work was, of course, made where the haulm had been removed—indeed, implements of this sort are not capable of dealing with very luxuriant tops, as the latter are apt to clog between the bars and the underside of the beam; but, as there is a fair amount of space in this machine, it did quite as good work as could be expected." Mr. Gregory claims now to have overcome the difficulty named. He has done away with the hind upright of the main frame, and thus with the danger of clogging referred to, and has affixed to the end of each prong of the front raiser a chain, which clears the potatoes of soil, and more effectually leaves them upon the surface.

The *Hardy Patent Pick Co.*, Sheffield, again exhibited their Disintegrator (Art. 4410), which was described in the report upon the implements at Nottingham (p. 110 of the present volume), and was then recommended for trial at the Windsor Meeting.

Mr. J. H. Carter, of Mark Lane, London, also exhibited as a new implement a patent disintegrator for general grinding purposes (Art. 5420).

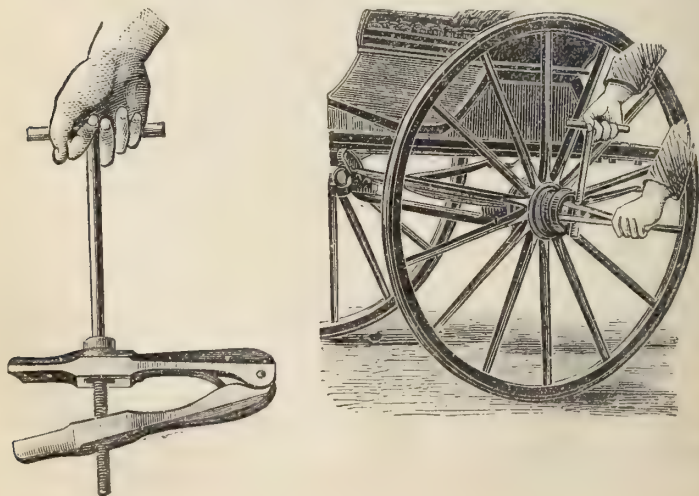
It having been resolved by the Council of the Royal Agri-

cultural Society to offer at the Plymouth Meeting in 1890 prizes for disintegrators, the Judges were agreed in recommending that these two exhibits may be exhibited as new implements at the Plymouth Meeting of the Society, and classified as exhibits for special inspection.

Messrs. Blackstone & Co., Limited, of Stamford, exhibited (Art. 4453) one of their well known prize haymakers, fitted with their new patent ratchet escapement. This recently patented improvement consists in adapting a ratchet box and pawl to each travelling wheel, so that when the horse stops suddenly, or relaxes his pace to turn, the flyers and teeth continue to revolve by their own momentum. The clogging of the working parts in ordinary machines is generally caused when turning at the end of a swathe, as then, owing to the flyers ceasing to revolve, the grass which is on the teeth at the time drops on to the boss or axle, and this, when the horse goes on again, is wound tightly round, until in time the action of the machine is entirely stopped, and work is delayed whilst the obstruction is removed. When this patent ratchet escapement is applied, clogging is impossible, as the flyers continue to revolve after the travelling wheels have stopped, and thus any accumulation on the working parts is prevented, and the grass on the ground where the machine turns is tedded. Another important advantage of this attachment is that the gearing is entirely relieved of all undue strain.

Messrs. Entwistle & Kenyon, of Accrington, exhibited an adjustable cap wrench (Art. 4928), for taking the oil caps off the

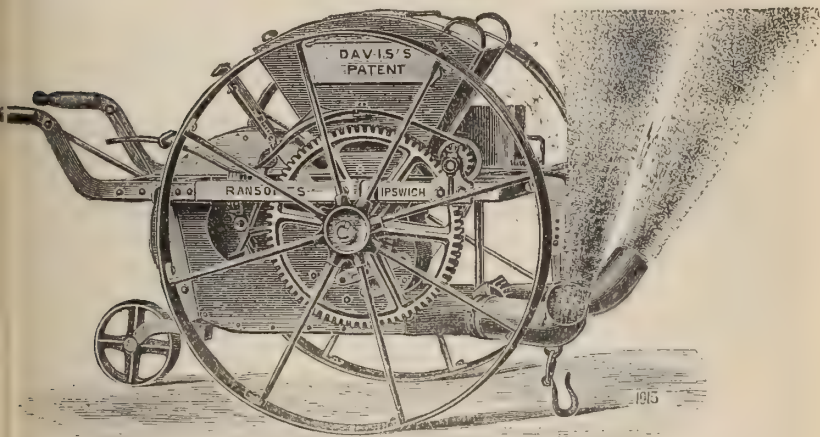
Fig. 23.—Adjustable Cap Wrench.



wheels of carriages, carts, &c. The Ewbank cap wrench consists of two jaws, about 9 inches in length, which are pivoted at one end, each of which is shaped at the other end so as to fit on two of the flats of the oil cap. A long T-shaped handle passes loosely through a hole in one of the jaws (at right angles to the length of it), and screws into the other jaw. By this screw the jaws are adjusted to fit any size of oil cap, and to grip it firmly, the long handle giving great leverage for the purpose of removing or replacing the cap. The wrench is very powerful and exceedingly simple in construction, and, being adjustable, will fit different sized caps.

Messrs. Ransomes, Sims & Jefferies showed Davis's Patent Sulphurator (Art. 5015), which consists of a wrought-iron frame mounted on a pair of wrought-iron road wheels, 3 feet 6 inches

Fig. 24.—Sulphurator.



in diameter and $3\frac{1}{2}$ inches wide, connected to an axle by the ordinary ratchet attachment. The front of the frame has secured to it a bracket turning down and forming an ordinary attachment for a single horse, but there are no shafts, the machine being guided from the rear by means of a pair of barrow handles.

Mounted on the wrought-iron frame is a fan having a wheel with curved blades, about 18 inches in diameter with 9-inch inlets. The lower or delivery side of the fan case is placed within 7 inches of the ground, and the blast of air is driven out parallel to it into a breeches pipe, terminating in a pair of pipes 5 inches in diameter and about 14 inches long, slightly curved

and capable of being lengthened by the addition of loose, straight pieces about 18 inches long. These branch pipes are arranged to swivel round the branches of the breeches pipe by means of a handle secured to one of a pair of bevil wheels, fixed to each pipe and geared together, so that the two pipes always assume symmetrical positions, and can be fixed by a pinching screw in any position from the horizontal to the vertical. The object of placing the pipes so low is to enable the underside of the lowest leaves of the crop to be reached. In the fork of the breeches pipe is a valve or hinged partition actuated by a spring catch lever directly over it, by means of which the blast can be directed at will and to any extent into either branch. The fan is driven by a spur wheel, about 20 inches in diameter, keyed on to the road-wheels axle gearing into a sliding pinion on a second motion shaft, the pinion being capable of shifting in or out of gear by means of a spring catch-lever, worked from the rear of the machine. The second motion shaft works a third motion by means of pitched chains, and this in turn drives the fan spindle by the same agency, the ratio of movement between the road wheels, and the fan being 42 to 1.

Over the fan is arranged a sheet-iron hopper for containing the material to be distributed. The road-wheels axle passes through the bottom of the hopper and carries a spiked roller which works in a carriage and through a comb on the front side. Underneath is a second spiked roller, revolving twelve times as fast as the road wheels, and driven by a pitched chain from the second motion shaft. Under the lower roller is a slide actuated by a spring catch-lever at the right side of the hopper, by which the rate of delivery can be regulated. The hopper is covered by a close-fitting hinged lid; the powder to be distributed falls in a uniform shower right across the current of air from the fan, the delivery pipe of which is at this point 6 inches wide by 4 inches deep, and, mixing intimately with the air, is carried out and distributed by the branch pipes. The machine will deliver from 20 to 25 feet high, it weighs 5 cwt., and is easily drawn by one horse. The back end of the implement is fitted with a trailing wheel, mounted castor fashion, and it will turn in the rows in a length of 4 feet 6 inches.

The machine is adapted also for liquid distribution by substituting a tank for the hopper, fitting it with an adjustable outlet, and substituting for the air pipes a series of nipples, arranged to suit the particular crop to be treated.

Mr. John Henry Knight, Barfield, Farnham, Surrey, exhibited a $\frac{1}{2}$ horse-power Paraffin Oil Horizontal Engine (Art. 5207), cylinder 4 inches diameter by 8 inches stroke, mounted on a

hollow cast-iron base plate, in the body of which a small trough or tank for the petroleum is fixed. On the main crank-shaft is a small pinion, gearing into another on a counter-shaft in front of the engine. On this shaft there are three cam-plates—one actuating the main slide of the engine; the second the inlet vapour valve and the pump, the stroke of which is also controlled by the governor; and the third cam-plate actuates the exhaust valve. At the rear of the cylinder is a heating chamber, which, before starting the engine, is heated up by an ordinary mineral-oil lamp. In starting the engine, it is first necessary to pump by hand a small quantity of petroleum into the chamber actuating the pump. Ignition is effected by a blast flame from a petroleum lamp, which heats a small coil of platinum wire fixed in the opening of the slide valve. The blast for this flame is obtained by a bellows worked direct from the crank-shaft of the engine. A trial of this engine was made, with the following results:—

Duration of trial	.	.	.	.	.	.	.	3 h. 5 m.
Brake horse-power	.	.	.	.	.	.	.	0.544
Consumption of petroleum during trial	.	.	.	.	.	.	.	5.94 lbs.
"	"						per brake horse-power	
							per hour	3.54 "

During the early part of the trial the engine ran very irregularly indeed, the weights on the brake having frequently to be relieved, in order to prevent the engine pulling up. The engine was not in a sufficiently developed state, and to perfect it considerable reduction must be made in the consumption of petroleum. The ignition is imperfect, and the exhaust is not sufficiently free, the noise from it being most objectionable.

The Farmers' Foundry Company, of Ryburgh, Norfolk, showed a Sheep Folding Hurdle (Art. 5277), strong and well-made, and very easily moved in any direction, being mounted on patent swivel wheels, which act in a similar manner to the castors on a chair.

The Harden Star Lewis & Sinclair Company, of Cannon Street, London, exhibited (Art. 5516) Muirhead's Patent Automatic Water Supply and Flushing Apparatus for horse and cattle troughs, which has been extensively used in Glasgow for the troughs in the city. It is said to give all the advantage of a constant run of water without unnecessarily wasting any, and, by flushing away in an ingenious manner any mucous or other matter left by the animals after drinking, to keep the troughs filled with clean water, and thus prevent the spreading of disease amongst the animals.

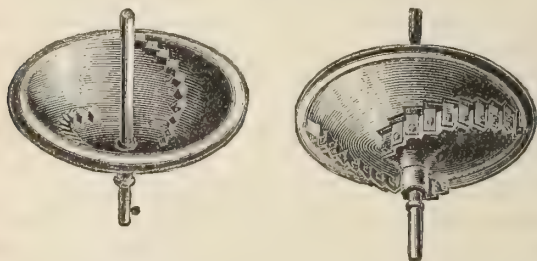
Messrs. Eddington & Steevenson, of Chelmsford, also exhibited.

bited (Art. 5590) a special driving band, which consists of steel wire rope, with cylindrical malleable iron stops fixed at certain intervals on it. The small cylinders are slipped over the rope, and two pins are driven through them and the rope; further to secure them melted tin is forced in between the cylinder and the rope. The rope works in an ordinary sprokett wheel. It is claimed for it that it is much stronger than ordinary leather belting at a corresponding cost, that there is no slip, all the advantages of pitch-chain gearing being obtained at much less cost. The exhibitor states that in tests made to try the breaking strain of this band, the rope fails in the ordinary way, but that the stops do not drag or weaken the rope where the attachment to same is made.

Messrs. Jas. & F. Howard, of Bedford, showed their Hay and Straw Press (Art. 5636), which is considerably improved since the trials of hay and straw presses at Nottingham, reported in the Journal last year (Vol. XXIV. p. 576). The steel cramps or "retainers" then used to hold the bale together temporarily are now dispensed with, and in their place a self locking clip is used; this, and the locking twister used to secure the wire, considerably facilitate work, and reduce by one-half the number of men employed. The straw comes out of the bales in excellent condition for use, and is not broken or damaged by the compression.

Messrs. W. N. Nicholson & Sons, Newark-on-Trent, had amongst their other exhibits a new pattern Turnip Cutter for

Fig. 25.—*Turnip Cutter for Sheep.*



sheep (Art. 5781). This appeared to be a development of the patent concave disc machine introduced by this firm, the concave being amplified until, in the new machine, it forms a deep cone within which knives of the Gardner pattern are fixed and the cutting is done.

Roots were not forthcoming for the trial of the machine, but it was stated that much less power is required for cutting than

in the Gardner machine, principally through the roots not being compressed in passing through the knives into the barrel, as must be the case in the Gardner cutter, where the inside diameter must necessarily be somewhat less than the outside. In the new machine the contrary is the case, and the outlet for the cut pieces increases in size as they leave the knives for the outside of the cone. Another advantage was very apparent, viz., that the knives can be replaced in case of need without dismounting any part of the machine. The illustrations show the form of the cone and the fixing of the knives.

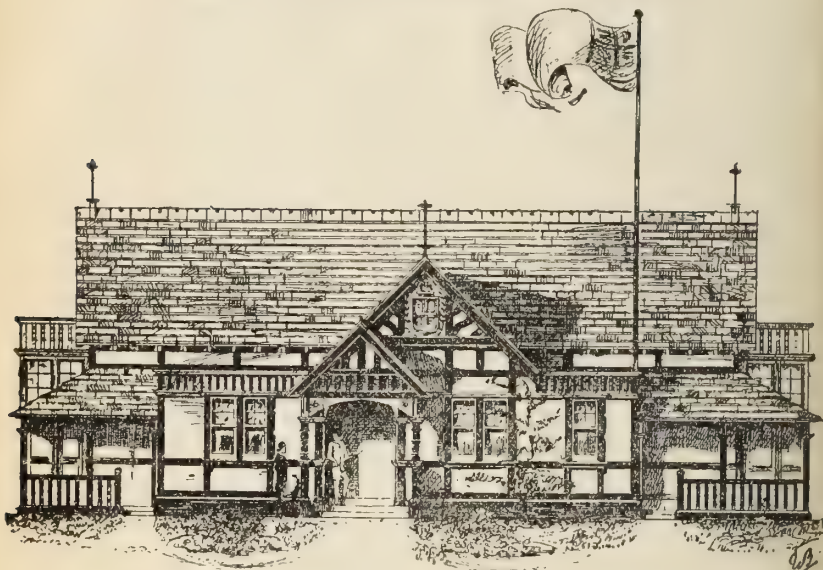
All the leading seed merchants were represented at the Show, conspicuous amongst their exhibits being the spacious and attractive stand of *Messrs. Sutton & Sons*, of Reading, at which was displayed a varied collection of grasses, seeds, roots, and flowers, for which the firm is justly celebrated.

Messrs. Carter & Co., of High Holborn, had at their stand an excellent exhibit of their New Cross-Bred Wheats, showing eleven selections which have been obtained after six years' care and attention devoted to the breeding, selection, and yearly re-selection, so as to secure a fixed character of the best forms. The objects sought have been early maturity, quality of grain and straw, vigour of constitution, with increased productiveness. They are now asking wheat-growers to try these new varieties in different parts of the country, and if the result should be as favourable as the experiments have been, there is no doubt that the English farmer will benefit very considerably from the enterprise of *Messrs. Carter*. It has been said that we should give up wheat-growing; but I hold that, in many parts of the country, wheat is a necessary crop, and any one who provides us with a new variety which, by reason of increased yield and greater market value, will be more remunerative, confers a great boon upon those who are wheat-growers.

One of the miscellaneous articles (7358) included in the Catalogue must not, although it was scarcely an agricultural implement, be passed over in silence, as it was one of the greatest attractions and ornaments of the Show-yard. For the special use of Her Majesty the Queen, as President of the Society, Mr. Wilson Bennison, the Surveyor and Superintendent of Works, had designed an elegant Pavilion, which was constructed, free of cost to the Society, by Mr. J. Charlton Humphreys, of Albert Gate, Hyde Park, London, S.W. It was made in sections at Mr. Humphreys' iron building factory in London, so that it could easily be taken to pieces. It represented a villa in the Queen Anne style. The exterior was of timber and cement work, with a covering of shingle stones. It was lined inside

with felt and match-boarding. The roof was covered with galvanised corrugated iron, the surface of which was neatly lapped with special boarding, and painted to represent Broseley tiles. The gables were enriched with the Royal arms. It contained drawing-room, reception, and five other rooms, all lofty and well appointed, the windows being finished in appropriate style. It had four handsome elevations, with a verandah at each corner leading from the drawing and reception rooms, and the porch harmonised with the other architectural features.

Fig. 26.—*The Queen's Pavilion (Front Elevation).*



The internal decoration and furnishing of the Pavilion were carried out by Messrs. James Shoolbred & Co., Tottenham Court Road, London, W. The rooms were decorated in the style of the English Renaissance, more familiarly known as Elizabethan, the decorations being all hand-painted. From the entrance hall, with its fresco representing autumn flowers, and grain with the sickle around it, one passed into the spacious reception room, its ceiling and cavetto decorated with strapwork in rich and golden hues, the Royal arms being introduced on quaint shields, and the walls adorned with wreaths of wild roses, with the legend:—

Gather you rosebuds while you may,
Old time is still a-flying:
For that same flower that blooms to-day,
To-morrow may be dying.

The carved furniture, rich carpets, and beautiful flowers made this room most delightful. The luncheon room opened from the reception room; the ceiling was green, with silver stars and the crescent. The walls were hung with imitation antique leather, buff-coloured, having fruit painted in natural tones, and the following texts in various colours:—

The valleys shall stand so thick with corn that they shall laugh and sing.
Thou bringest forth the fruits of the earth in due season.
The earth, O Lord, is full of Thy goodness.

The blinds were yellow silk, festooned with frilled edges; the furniture dark oak, of the Elizabethan period.

The Prince of Wales's room was decorated with the Prince of Wales's feathers and mottos with monogram A.E. The furniture dark oak, including an old grandfather's clock richly inlaid with coloured woods and relieved with brass mounts. The Princess of Wales's room was decorated with monogram A., silver filling and blue dado, yellow silk blinds, and appropriate furniture.

Messrs. Sutton & Sons, of Reading, were entrusted with the important task of carrying out the whole of the floral decorations. On all sides the Pavilion was draped with appropriate climbing plants, the Virginia creeper, ivies green-leaved and variegated, the Mexican *Cobæa scandens* with its large purple goblet-shaped blossoms, the yellow-flowered canary creeper, and others. At the principal entrance were seen vines, bearing clusters of purple grapes, entwining the pillars which supported the roof of the porch. On the north, south, and west sides of the garden were straight borders having a background of coniferous plants, green, golden, and silvered. Below were beds of foliaged or flowering plants, and in places fine specimens of the beautiful cut-leaved Japanese maple; an edging of blue compact lobelia, alternating with the elegant grass-like isolepis, completed the border on the three sides. The velvet lawns produced from Sutton's fine lawn grass seeds were so exquisitely close, fine, and green, that they might have been growing many months, but as a matter of fact were only the production of a few weeks. In the centre of each lawn was a fine specimen of Japanese retino-sporas, one of the handsomest of the smaller-growing coniferous plants, and on the north and south sides of the garden the initials V.R. were formed in the grass with blue lobelia, creating a very charming effect.

The erection of the Pavilion, the internal and floral decorations, and the furnishing were all carried out within a very short space of time, in the most complete manner, and with the

most perfect taste, reflecting the greatest credit upon all concerned, and the eminent firms named have every reason to be proud of their share in it. I should mention that Her Majesty was graciously pleased to accept the whole as it stood as a gift from the respective firms for erection at Osborne.

I have now exhausted my list. I have noticed, besides the implements and machines to which Prizes or Silver Medals were awarded, a number of others which the Judges considered worthy of special notice, and I have also shortly described a few small but useful articles which are easily overlooked amongst a large number of more important ones, but for which almost every farmer at some time or other feels a want.

It now only remains for me, on behalf of the Implement Judges, to acknowledge the assistance and guidance they received from the Stewards and the Engineers of the Society during the eight days on which they were engaged, and the courtesy and promptness which they met with at all the stands. On my own behalf I must personally thank my colleagues for their valuable help, and specially the Engineers, Mr. Anderson (whom I should wish to congratulate upon his appointment as Director-General of Ordnance Factories), and Mr. Courtney, for very kindly aid, without which I could not have hoped properly to fulfil the honourable task allotted to me by the Council of the Royal Agricultural Society.

XXVIII.—*Report of the Senior Steward of Stock at Windsor.*
By the late W. H. WAKEFIELD.

[A melancholy interest attaches to the subjoined report, as the life of its kindly and accomplished writer came to a sudden and untimely end in the hunting-field on Friday, November 8, 1889, from heart-disease. Only two days before, he had been present at the Council meeting at Hanover Square, and had taken, as was his wont, an active part in the discussions which then arose. Mr. Wakefield was elected a member of Council at the General Meeting held on May 22, 1871, and was appointed a Vice-President on November 3, 1886, in the room of Sir Edward Kerrison, Bart. During his eighteen years of service on the Council he took a very active share in its debates, and in the deliberations of the Committees on which he sat. He was first elected a Steward of Live-Stock for the Hull Meeting of 1873, and retired as Senior

Steward after the Birmingham Meeting of 1876. He was again nominated as Steward of Stock for the Norwich Meeting of 1886, and it thus fell to his lot to be Senior Steward at the historic Windsor Meeting, a position of which he was justifiably proud. Always courteous, always open-minded, always anxious to see right done, Mr. Wakefield was one of the most prominent members of the Society's Council, and his painfully sudden death has given a great shock to his colleagues and fellow-workers.—ED.]

I AM reminded by the Editor that it devolves upon the Senior Steward to write an introduction to the professional reports of the Stock exhibited at the late Windsor Show. Time was when it was the duty of the Steward to write the report itself, and there have been those in office both able and willing to do this satisfactorily. But, for many years past, the Council have called in the professional assistance of experts who should have nothing else on their hands during the Show to prevent their devoting their whole time and attention to examining carefully and reporting upon the whole of the classes. They may, more or less, be guided, in the drawing up of their reports, by the decisions arrived at by the Judges, who, as a rule, are the best men to be found in the United Kingdom for their special task. Occasionally, however, the professional report conflicts with the Judges' decisions, and this, on the face of it, has an appearance of inconsistency, by all means to be avoided if possible. But it must be remembered that the decisions of the Judges are arrived at under the particular circumstances of the judging day—possibly, as has not infrequently been the case, under the disadvantages of cold and rain, more trying to some animals than to others. We have only to fancy high-class animals delicately nurtured, standing out in bad weather before the Judges. A horse, for instance—ears back, tail tucked in, back up—could he possibly do himself justice? The professional reporter, of whom we must also take it for granted that he is fit for his work, has the advantage of arriving at his conclusion after repeated inspections in the boxes or elsewhere, and the parades on four consecutive days afford great advantages in the case of horses and cattle. I would here draw attention to the fact that the entries of live-stock at the Society's first Show in 1839 were 251; at Windsor this year they were 3,997—a development in keeping with the general progress of the last half century, and also a number amply sufficient to monopolise the undivided time and attention of the best qualified reporter.

The Council of the Society, with the warm approval of the members at large, resolved from the first that the fiftieth Country Meeting should be celebrated in a manner worthy of the occasion. The gracious acceptance by Her Majesty the Queen of the office of President of the Society, and the consent of H.R.H. the Prince of Wales to undertake the duties of Acting-President, were at once an augury and a guarantee of success. The list of prizes was materially increased, not only by exceptional grants from the Society's funds, but also by the assistance of the Mansion House Fund (established by the Lord Mayor for the purpose of identifying the metropolis with the event, and of assisting to defray the exceptional expenditure in connection therewith), by the Windsor Local Committee, and by the various Live-Stock, Stud-, and Herd-book Societies throughout the Kingdom. Her Majesty the Queen, as President of the Society, was pleased, moreover, to offer, in commemoration of the occasion, a number of gold medals to the exhibitors of the best stallions and the best mares in the horse classes, and to the best animals of each of the fifteen breeds of cattle, as well as to the First Prize winner in the Champion Butter-Making Competition. The gratification of the winners of these cherished honours was immensely enhanced by the fact that Her Majesty was pleased graciously to present each gold medal in person on the occasion of her first visit to the Showyard.

As the time of the Show approached, it became evident that British breeders of live-stock had determined to support it in a manner which surpassed the most sanguine expectations. The statement at the top of page 549 shows the amount of prize money offered, with the number of entries and the number actually present in each section.

The entries were largely in excess of that of any previous Meeting of the Society. Kilburn, when the Show was an international one, and unusual attractions and facilities (not the least being the proximity of the Showyard to the great railway termini) were offered, had hitherto marked the extreme limit. The entries on that occasion were at least a thousand more than the normal average, and no one would have ventured to predict that Windsor, with its comparative inaccessibility from many parts of the country, would exceed by over eleven hundred entries the "high-water mark" of Kilburn. The statement at the foot of page 549 shows the entries of horses, cattle, sheep, and pigs at Windsor both in 1889 and in 1851, at Kilburn in 1879, and Battersea in 1862, and at the first Meeting, at Oxford, in 1839. A column is also added giving

Live-Stock	Prize money offered ¹	No. of entries	No. of absentees	No. of entries present	Live-Stock	Prize money offered ¹	No. of entries	No. of absentees	No. of entries present
<i>Horses.</i>					<i>Cattle (continued).</i>				
Thoro'bred Stallions	£ — ³	21	1	20	Dexter-Kerry	115	59	2	57
Hunters	491	258	75	183	Other Breeds	30	8	1	7
Coach Horses	280	57	9	48	Dairy Cows	180	62	10	52
Hackneys	401	148	29	119	Total Cattle	3,952	1,637	154	1,483
Ponies	301	67	6	61	<i>Sheep.</i>				
Harness Horses, &c.	120	41	16	25	Leicester	120	41	4	37
Shire	450	167	44	123	Border Leicester	120	31	—	31
Clydesdale	425	93	21	72	Cotswold	120	60	5	55
Suffolk	420	105	25	80	Lincoln	120	58	12	46
Draught	120	15	2	13	Oxford Down	145	82	9	73
Total Horses	3,008	972	228	744	Shropshire	130	212	27	185
Asset	30	17	—	17	Southdown	145	123	17	106
<i>Cattle.</i>					Hampshire Down	120	78	11	67
Shorthorn	420	222	24	198	Other Breeds	1,487	384	32	352
Hereford	340	121	9	112	Total Sheep	2,507	1,069	117	952
Devon	330	84	5	79	<i>Goats.</i>				
Sussex	287	97	12	85	Goats	45	37	1	36
Longhorn	90	11	—	11	<i>Pigs.</i>				
Welsh	290	49	2	47	White	360	81	11	70
Red-Polled	280	71	4	67	Berkshire	140	98	22	74
Aberdeen-Angus	290	87	5	82	Black and Tamworth	240	88	12	76
Galloway	290	46	8	38	Total Pigs	740	265	45	220
Highland	90	18	—	18	Total Live Stock	10,282 ³	3,997	545	3,459
Ayrshire	260	50	7	43					
Jersey	325	434	44	390					
Guernsey	220	141	20	121					
Kerry	115	77	1	76					

¹ Including value of Queen's Gold Medals, and Champion Prizes offered by various Societies, &c.

² The premiums for these stallions, amounting in all to 4,200*l.*, were awarded by the Royal Commission on Horse Breeding, and the Royal Agricultural Society at the Spring Show held in the Royal Agricultural Hall in February, 1889.

³ Excluding 334*l.* offered for Poultry and 1,051*l.* for Produce.

what may be termed the normal average of entries, being the mean number at the seven Shows immediately preceding that of this year. The places of meeting in those years were Nottingham, Newcastle, Norwich, Preston, Shrewsbury, York, and Reading, all of them towns at which a large show of stock might be reasonably expected.

	Windsor 1889	Average of 7 years 1882-8	Kilburn 1879 ¹	Battersea 1862 ¹	Windsor 1851	Oxford 1839 ²
Horses	972	462	815	286	120	117
Cattle	1,637	590	1,007	790	385	28
Sheep	1,069	467	841	714	316	86
Pigs	265	192	211	195	167	19
Total	3,943	1,711	2,874	1,985	988	250

¹ Including Foreign cattle.

² Including extra stock.

I leave, of course, to others to tell of the increase in the Implement Department; but I may be allowed still further to

emphasise the development of the work of the Society, so far as its country Show is concerned, by stating that at Windsor, in 1851, ten acres of ground in the Home Park sufficed, while in 1889 127 acres were all little enough to do justice to the exhibits of every description, from the best shorthorn bull down or up (according to liking) to the last new thing in machinery, where milk went in at one end and butter came out at the other! What was the space occupied at Oxford in 1839, with 54 implements and 251 head of stock, I have no means of ascertaining.

It fell to my lot to act as Senior Steward at Birmingham in 1876. Then, too, the Show was held in a park, but it was a people's park, formerly owned by the Aston family, and afterwards acquired by the Corporation for a recreation ground—long may it remain so! And now, after an interval of thirteen years, it is no little satisfaction to have been connected with the mighty Show which was held in Windsor Great Park. What may be in store for a younger generation no one can foretell, but I and my compeers may surely say—we ne'er shall look upon its like again. Pleasant, very pleasant, recollections crowd on me as I write, and the faces, well remembered, of many who are numbered with the majority stand out clear and sharp against memory's horizon. But good men and true are still left to us, though it may be the fashion to say of the past—"there were giants in those days." So there may have been, and I believe it was so; but, so far as I can see, the stature is not decreasing.

I will not here particularise—it would be tasteless to do so—yet I cannot forbear from here mentioning a number of young men who have now been acting for several years as Assistant Stewards. To them the Society, so far as the order and regularity of the Show is concerned, owes much. To the Stewards is given a credit for success which is due to others who, being out of sight, are out of mind. Some of them, if not actually ubiquitous, seem able to be in two places at a time; at any rate, they were always in the right place, and the right men in it. Let me take this opportunity of thanking them for their indefatigable services, and of wishing them in their future lives the success which, so far as I can judge, is most certainly their due. I had the great pleasure of acting as host, on behalf of the Society, to a number of invited guests, representatives of the Highland and Agricultural Society, and of the Royal Dublin Society, and a very pleasant time we had at Clewer Lodge, where we were domiciled. I only mention this in connection with the above. They said to me, "Tell us how it is that

your great machine works so smoothly; we only see a very small number of Stewards." This was soon explained by the presence of as many of the Assistant Stewards as I could get together that same evening at short notice round our dinner table; and this, by a very easy and natural transition, leads me on to the Honorary Director, the organiser of all this successful working.

I remember well, when writing my last report in 1876, saying, "Worthily has fallen upon the shoulders of Mr. Jacob Wilson the mantle of Sir Brandreth Gibbs," then, alas! too soon to be taken from us. And now, if I may presume to make myself the mouthpiece of Sir Jacob Wilson's colleagues on the Council, may I be allowed to say how very heartily we congratulate him on the honour conferred on him by our Queen? I could easily say more, but I forbear. I would only add—and this very seriously and sincerely—may Sir Jacob Wilson long continue to bear the distinction so deservedly conferred on him! In the expression of this wish I know I have the hearty sympathy of the agricultural community throughout the civilised world.

One more point and I have done. On all sides one hears said of the late Show, "What a success! What a pot of money you must have made! What will you do with it all? What whacking big prizes you'll have to give next year to get rid of it!" "There is nothing so successful as success;" it *was* a success, and a right good bumper too. But success is not by any means to be measured by the financial result—and, in point of fact, the cost of the Show exceeded the income. We knew beforehand this would be so. It was the Jubilee year of the Society, and it was thought right—and I maintain emphatically it *was* right—that everything should be done on a scale in proportion to the occasion. The Queen was to be our President, the Show was to be held in Windsor Park. The number of our members had recently increased by close on 2,000, and we had the year before at Nottingham been 4,000*l.* into pocket. We had no expectation that the number of visitors to the Show would be in proportion to the vast *necessary* expenditure, for we could not hope to tap the London millions; and it was just as well we did not, for the railway companies, whose resources, as it was, were taxed to their utmost limit, would probably have broken down under the strain, more especially as the Show was held the week after Ascot.

I feel satisfied, knowing as I do how things were looked after, that no money was wasted, though it *was* the Jubilee Show, but that, with very few exceptions of a trifling character, the Society

got 20s. of value for every 1l. expended. If, then, it be the fact that the Windsor Show cost the Royal Agricultural Society 5,000l., there or thereabouts, no one regrets it, all having been done that could be done to insure success—and this we got; and if it was all to be done over again we should do exactly the same. There is a time for everything, and the Jubilee Show was not the occasion to husband our resources, but to spend them judiciously.

Last, but not least, may I tell of how the Queen was interested in the Show? She came again and again; and, so far from being wearied with her repeated visits, the interest to see more seemed to grow, as testified by those who were in attendance on Her Majesty when the Show was in reality breaking up. Can I find more fitting words to finish my report than “God save our Gracious Queen”?

XXIX.—*Report on the Horses Exhibited at Windsor.*

By WILLIAM A. BLEW.

THE visitor to Windsor, bent upon making the horses his first study, might well have been amazed at the wealth of horse-flesh, as indicated by ninety-four pages of catalogue, and as much shedding as would more than suffice for the accommodation of the whole of many a provincial show. In short, the number of horses exhibited at Windsor was considerably in excess of that ever seen in England at any other show, and this record was reached without the assistance of foreign horses, which, in a class to themselves, helped to swell the entries in 1879—the disastrous Kilburn year. But it is not in point of numbers alone that the fiftieth Show held under the auspices of the Royal Agricultural Society of England will stand out from those which have preceded it. With scarcely an exception, all the classes of horses were up to the average standard of excellence, while several of them, to be noticed in due course, were exceptionally good, owners and breeders having loyally responded to the liberality of the Council in making the Jubilee Show one of the most glorious on record. Never since the Royal was held on the Kilburn clay has the *locale* been so near London as it was in this year 1889; and when, on the Monday morning, a slight rain fell in town, the recollection of all the horrors of ten years ago instantly recurred to the memory. One could but remember how “worn-out chargers staggered and sank” when the railway and other

vans reached the Showyard; how hunters laboured heavily in ground deeper almost than the Claydon Woods in a wet hunting season; how hacks could scarce show their action in the mire; and how the "feather" of the draught horses became a matted and tangled mass. But, as the sequel showed, there was no need for misgivings. The rings at Windsor were excellent going; and every horse, of whatever breed, was enabled to show himself to the best advantage.

During the half-century which has elapsed since the Royal Agricultural Society held its first Show at Oxford, and when a company of well-nigh 2,600 banqueted in the quadrangle of Queen's College, a vast change has come over horse shows; and it may not be out of place to glance briefly at their history and progress. The horse show, as we see it now, is a comparatively modern institution. In 1839 there were exhibited at Oxford no more than twenty-two horses, all told; ten were agricultural stallions, seven were general utility sires, whose mission it was, in pre-specialist days, to beget hunters, harness horses, hacks, and carriage horses; and there were five mares and foals. Surely, Rome itself had no smaller beginning; and what Eutropius said of that city is true of the horse show, viz. that when it did increase there was nothing much bigger in the whole world.

In 1841, however, when the Royal Show was held at Liverpool, the horses dwindled down to nineteen—only two in excess of the number of asses entered in 1889—in consequence, probably, of omitting the class of hunting and coaching sires, which at the outset does not seem to have been a success. The premium for this class of horse, however, was subsequently reinstated, and in 1843 (at Derby) a new departure was taken, in the official report, by giving the pedigree of the successful sire—"by 'Jerry'—'Beeswing's' dam, bred by William Orde, of Nunnykirk." In the Shrewsbury year (1845), out of compliment, no doubt, to the neighbouring Principality, prizes were given for Welsh mountain ponies; but the display was so poor that the discontinuance of the experiment was recommended. Luckily, however, for latter-day pony owners, the suggestion was not acted upon, as Welsh ponies figured in the catalogue at Gloucester (1853) and five years later at Chester, where the "Prince in Wales," as the late Sir Watkin Wynn was termed, gave a special prize for them. Pony stallions and mares had had a place intermittently at the Shows; but by 1862, when the *locus in quo* was at Battersea, ponies for riding and driving were so far a feature of the exhibition that one was sold for 150l.; two found purchasers at 100l. each; two were sold at

60*l.* apiece; and two at 50*l.* each. Since that time pony owners have never looked back, and the standard and value of these diminutive steeds have gone on increasing, until, at the present time, I have good authority for saying that something like 500*l.* would be forthcoming for Mr. William Pope's brown pony "Fanny," by "Red Robin," who, at Windsor, won First Prize for harness ponies not exceeding thirteen hands, in addition to numberless firsts all over the country.

It was not, however, till the year 1848, when the Royal Show was held at York, that light horses came in for much attention; and I trust I may be pardoned for saying that even then it was only chance. In honour of the occasion the Yorkshire Show was not held that year; the lesser was content to be merged in the greater—so the Yorkshire Agricultural Society made a handsome contribution towards the working expenses of the Royal, and 210*l.* found its way into the "horse department." The Royal Agricultural Society maintained its own programme of 5 classes for agricultural horses; but, by way of acknowledgment to other Yorkshire friends, added out of the contributed funds 7 classes for local horses in which heavy steeds found no place. The schedule for that year comprised classes for hunter sires; for sires of carriage horses; for roadster stallions; for Cleveland sires; and classes for corresponding mares and foals. Norwich and Exeter, it must be confessed, did little for light horses; but at Windsor, in 1851, classes were devoted to hunters, coaching, and roadster stallions respectively, and a class for Norfolk mares and foals crept into the programme.

Afterwards agricultural horses monopolised most attention till 1855, when at Carlisle there were extra classes for thoroughbred and coaching stallions, also for hunter fillies and geldings; and at the Chelmsford Show in 1856, some special prizes were given for which hunters again had a chance. The giving of prizes for hunter fillies and geldings was continued, and F. Barlow, in whom the reader will recognise a well-known breeder and authority, took the First Prize with a black-brown hunter gelding, "Lord Darnley" being successful in the class for two-year-old hunter geldings. After a good many ups and downs in the way of numbers and quality, the Warwick catalogue, in 1859, showed a total of 212 horses, of which 24 were hunting mares or geldings. At Leeds, in 1861, a class for "blood hunters" was added, and, in connection with the growth and popularisation of horse shows, it may be noted that in this year for the first time the various classes were "shown day after day in the rings in which they had been judged"—a new departure, we are told, which was much appreciated by the spectators.

Further innovations were in store. In 1864—on the same day on which the hunters belonging to the late Lord Henry Bentinck, who had been Master of the Burton Hunt, were sold—the late Mr. Samuel Sidney managed the first horse show ever held at the Agricultural Hall, Islington, when for the first time horses were ridden and driven in the ring, and leaping competitions formed part of the programme. The Royal Agricultural Society so far followed the example set them that when they held their Show at Newcastle, a few weeks after the Islington fixture, the hunters and hacks were ridden instead of being shown in hand, as on previous occasions; while at Bury, in 1867 (there was no Show in 1866, in consequence of the raging of the cattle plague), the Society made a further concession to the popular taste by having a leaping bar put up in the ring in which the hunters were judged, over which all hunters above the age of three years might, if their riders chose, exhibit their prowess; though, at the same time, the decisions of the Judges were to be in no way influenced by the “timber-topping.” On this occasion seventeen weight-carrying hunters and fifteen four-year-olds were exhibited, and a good many of the riders indulged in “larking” over the bar, to the unspeakable delight of the onlookers. Those responsible for the report of that year were inclined to be in favour of the introduction of jumping, believing that it would be “of great service financially” to the Society. At Leicester, however, in 1868 (where the show of light horses was very poor for the headquarters of fox-hunting), the ground was so hard and slippery that jumping was out of the question; and in 1869, at Manchester, gorsed hurdles were substituted for the bar. The compilers of the report now differed from the opinion of those who had spoken two years before, and recommended that the jumping should be discontinued, lest the Royal Agricultural Society should incur the reproach of making their show, so far as the horses were concerned, merely a medium of collecting money. This view has prevailed, for, as every one knows, neither leaping bars nor gorsed hurdles are now seen in a Royal Show ring.

To revert to the year 1864, the idea of the Islington directors of making a horse show a popular affair was a novel one; and no one, at that time, regarded the exhibition of their horses as anything more than an amusement. The “professional exhibitor,” as he is called, had not then been invented; there was no Shire Horse Society; a Hackney Stud-book was not even dreamed about; nor were Cleveland bays, Yorkshire coach horses, Clydesdales, Suffolks, or Hunters objects of solicitude to specialist societies. Horse shows, however,

“took”; their numbers increased, and, as soon as ever it appeared worth while, owners were found to devote themselves more or less exclusively to showing horses in any place at which prizes of sufficient value were to be competed for. It is impossible to deny that one result of the multiplicity of horse shows, and the calling into being of the regular exhibitor, has been to cause a number of horses to be dedicated to show purposes only. After an open season, when the terrible firing-iron, charges, blisters, and embrocations are common objects of most stables in which the *bonâ fide* hunter is found, the show hunter steps forth with legs as fine as a foal's; there is scarcely a windgall to be seen; no honourable scars indicate that he has run foul of wire, rapped his knees against an oaken rail, been staked, or even allowed his master to hang on by his spurs. High in flesh, as fresh as a four-year-old, and unblemished, the show hunter, indeed, emphasises the fact that to succeed in an undertaking one must devote oneself to it alone. Some exceptions there are of course, and among horses that have been regularly hunted “Tommy Giles” deserves mention, as in 1888, and during the past season, he has met with many successes in the show ring. Still, it is a fact well known to those conversant with horse shows, that some of the horses who have borne away no end of rosettes would be anything but confidential conveyances over a country. In fact, it is an open secret that two of the grandest horses that have caught the eyes of Judges during the past ten years have been worse than useless in the field. The same is true of hacks, a certain number of which do no road work to speak of.

The fact of prizes going to hunters which are not fairly ridden to hounds, and to hacks and roadsters which have never done a real day's work in their lives, is often the basis of an indictment against horse shows; but, in the humble opinion of the writer, the charge that horse shows do not encourage the breeding of horses cannot be sustained. One must discriminate between encouraging the use of a horse, and encouraging the breeding of him. Confining our remarks for the present to hunters, hacks, and harness horses, one of the most frequent complaints of breeders has been that they have had to wait so long before they turned over their money, and that while they were making a hunter, or breaking a hack or harness horse, some accident often occurred which reduced the value of their property by about 50 per cent. Now, given the existence of a shapely yearling or two-year-old, good-looking enough, that is to say, to stand a fair chance of winning prizes at shows, the breeder need not long stand out of his money. The practice of including at

shows classes for young stock has been instrumental in making a market for promising youngsters such as never presented itself to the breeder of ten or fifteen years ago; while it is notorious that an energetic showman will pay for a yearling, a two- or three-year-old, a price far in excess of what would be given by any one whose intention it was to throw the youngster up, and make him or her into a working horse in due time. Of course, these liberal prices do not fall in the way of haphazard breeders—men who think any old, worn-out, or undersized mare good enough to breed from; but the fact of money being always forthcoming for anything good is a direct inducement to men to try and breed something out of the common.

For these reasons, therefore, it seems to the writer that the modern horse show, though in some degree encouraging what is artificial, does tend towards improving the breed of horses; while, at the same time, the various societies of which mention has already been made also do their share towards achieving this very desirable end. In short, the show horse, like the race horse, gets a kind of fictitious value by reason of his ability, or supposed ability, to prove victorious in contests.

This year a new and, as the writer ventures to think, a more convenient arrangement was adopted in the framing of the catalogue. Instead of putting the stallions, mares, young stock, and what may be termed working horses together—a classification involving the mixing up of all the various breeds, and rendering the search for any particular class a work of difficulty—all the animals of each breed were catalogued and stabled together; and for the purposes of this report the official order may be adhered to, a commencement being made with

THE THOROUGHBRED STALLIONS.

These were now assembled merely for parade purposes, the judging having taken place in February last at the Agricultural Hall, Islington. The sires which have been serving in the four Scottish districts were not called upon to come to Windsor, as they were exhibited in July at the Highland Show. "Sir Joseph," who travelled the Beverley district, in Yorkshire, died on May 7, 1889; but, with the exception of those five horses, all the winners of the 200*l.* premiums were present at Windsor. "Baldur" and "Truefit" looked magnificent specimens of the thoroughbred horse, and quite dwarfed little "Pearl Diver," who is, however, thickening out, and was deservedly admired by those who have a leaning to what is colloquially designated a "wire and whipcord" horse. "Blue Grass," too, though

possibly less like a hunter than some of the others, is a great favourite in the North of England, and looked remarkably well ; while "Scherzo" and "Silver Crown" have, perhaps, come on as much as any of the sires passed last February. Criticism, as everybody knows, has been liberally meted out, both on the horses themselves, and on the scheme determined upon by the Horse-breeding Commission ; but, so long as a tenant farmer can secure the services of sires such as those seen at Windsor, for the nominal sum specified, he is a bold man who would say that the farmer has not something to be thankful for. Mr. Gilbey's "Pedometer" lived to appear at Windsor with the rest, but unfortunately he has since died.

An attempt has already been made on a previous page to give an outline sketch of the progress of horse shows ; but it is curious to note how, in some instances, opinion has completely veered round, and suggestions made a long time ago have been adopted. The class for thoroughbred sires is as old as the Royal Show itself, though the Judges of an earlier day had to decide upon the horses with reference to their aptitude for getting hacks and carriage horses as well. I find, however, that in 1839 there was a condition annexed to the stallion class that the horses should have served during the season at a fee not exceeding 3*l.* ; but the prize was withheld for want of merit in the competitors. In course of time, however, this proviso as to fees appears to have been withdrawn, and eventually two classes of sires (exclusive of coaching and hackney sires) were catalogued, one for thoroughbred and one for hunting stallions, in which division half-bred sires competed. In 1860, Mr. J. E. Welby, writing about the Canterbury Show, pointed out that, as the prize at Leeds in 1861 was to be 100*l.*, it was useless to give that sum to horses whose fees were 50*l.* and 25*l.*, at which sums the first and second prize winners at Canterbury respectively served ; and he proposed that no sire should compete for the Society's prizes unless his fee did not exceed 5*l.*

HUNTERS.

The Hunter Mares and Foals were pronounced a very excellent class as soon as they came into the ring ; yet, curiously enough, out of the twenty-three mares comprised in the first two classes, five only had foals by sires who have won premiums in this or the two preceding years, the sires represented being "Baldur," "Escamillo," "Truefit," "Pedometer," and "Peppermint." Upon the principle of nothing succeeding like success, the chances of the famous chestnut mare "Marion," by "Grand-

master" (her foal by "Canadian"), were canvassed as soon as she was led into the ring. When she belonged to Mr. John Goodwin, of Cheltenham, she seldom, if ever, missed a first prize; but now that she has passed into the possession of H.R.H. the Prince of Wales, by singular ill-luck "Marion" obtained merely the barren honours of high commendation. This, however, was not due to caprice on the part of the Judges, for "Marion" has a suspicious-looking hock, which beyond doubt kept her out of the first three. Had no such defect existed there would have been a very close fight between "Marion" and Mr. Cooper's beautiful chestnut mare "Florimel," by "Tom Ball." "Marion" would in all probability breed the more weight-carrying stock, but "Florimel" has not a bad point in her. She is apparently as nearly thoroughbred as possible, and, with her fine shoulders, strong loins, and excellent back, gives the spectator the idea that in her day she could have made the journey "from Crick to Misterton"—her home is in Northamptonshire—without putting a foot wrong. As a two-year-old Mr. Blenkin's "Princess Beatrice," by "Bay President," carried all before her in 1885; but in her more mature years she has not been so successful as of yore; indeed, one cannot help remarking that horses devoted to show life in their youth rarely continue to hold their own in what should be their prime. I have seen "Princess Beatrice" since she first came out, and should say that she has never done a day's work in her life; but horses are, no doubt, like human beings—generous keep without corresponding work tends to spoil the figure. "Florimel," it should be added, besides being placed first in her class, gained the Champion prize of 25*l.* given by the Hunters' Improvement Society for the best mare in the first two classes.

In the second class, for Hunter Mares not having had a foal in 1889, but served in 1889, the First Prize went into the hands of Captain Fife, who, as the head of the Compton Stud, has worked hard in the cause of horse-breeding, and has almost popularised it in a quarter of England—Dorsetshire, to wit—wherein it had never before deeply taken root. His mare "Mermaid," by "Baron Cavendish," well merited her honours; and mention may be made of the second because it was none other than "Old Quibble," the once well-known steeplechaser, now shown by the Hon. Mrs. Cecil Howard.

After having seen all the brood mares, however, one was constrained to ask, "How are fifteen- and sixteen-stone hunters bred?" What kind of mares were the dams of the horses the late Mr. Fenwick Bissett used to ride when he was master of the Devon and Somerset? How were the horses bred which the

late Bob Ward, the gigantic huntsman of the Hertfordshire, used to ride? And what kind of dam threw the horses which carry Mr. Merthyr Guest, Mr. Muntz, and other straightgoing welter weights? The answer may be hazarded that these sixteen- to nineteen-stone horses would not come from any of the hunter mares seen at Windsor. I am inclined to think that those have reason on their side who aver that the heavy-weight horses we so much admire—when we see them—are the freaks of nature for which there is no accounting, and which cannot be bred by any rule. If we adopt the various theories promulgated from time to time, we find that the dam of a weight-carrying hunter must have thoroughbred blood in her veins; she must also have pony blood; she must be a more or less distant connection of the carthorse for the sake of bone; and in the meantime the cross may have filtered down through the various stages of vanner, machiner, and what not. Let us, however, assume that, having asked for this theoretically perfect brood mare for weight-carrying hunters, we have obtained her. We shall then find ourselves in possession of an animal with varied relationship, to any one of which she may throw back. Will the produce be a pony only fit to carry our youngest child? Will it be a heavy-headed, flat-sided animal which may eventually fall into the hands of our coal merchant? Or will it haply be a sixteen-stone hunter? Who can tell?

Experience seems to point to two facts—first, that it is unwise to breed from a mare whose previous history is unknown to the breeder, for her produce may partake of the characteristics of the sire or sires with which she may previously have mated, just as the half-dozen foals thrown by a mare which was put to the horse after having once been covered by a zebra were all marked with the zebra stripes. Secondly, it may almost be regarded as an axiom that the nearer thoroughbred the mare is, the less danger is there of her throwing a foal very unlike herself or the sire. This strain, however, will not produce, except perhaps once in a lifetime, the fifteen-stone hunter; so, in some form or other, recourse must be had to a heavier stamp of horse. In the palmy days of Irish hunter-breeding the question was satisfactorily solved by putting such sires as “The Old Bird,” “Midge,” “Elvas,” “Naverino,” “The Regulator,” or “Mallet” to one of the clean-legged cart mares indigenous to the country. But a “Practical Breeder,” writing in the *Dublin Union* of August 27, 1887, ascribes the falling off in Irish hunters to the exportation of these native mares, and the introduction in their stead of Clydesdale blood. Mr. Archibald Peel, who hunts in Sir Watkin Wynn’s country, tried the experiment of breeding hunters from

light-legged Welsh mares, and was, a few years since, satisfied with the result.

To return to the Show-ground, however, it might be worth while to classify hunter brood mares according to weight, making the minimum of one class fifteen stone, as under that arrangement heavier mares, which could have no possible chance of success against those showing more "quality," could win prizes.

The classes for *Young Hunters* were exceedingly satisfactory; and the three-year-old geldings numbered twenty-two. Mr. Charles Clarke, of Ashby-de-la-Launde, appears to have acquired the secret of turning out a constant supply of well-shaped youngsters, his name appearing more than once in the list of breeders.

Here, as in other departments of the Show, the different opinions which Judges entertain were made manifest, for the First Prize fell to Mr. J. R. Hobson's fine brown colt, "Mikado" by "Martyrdom," who was third at Nottingham last year in the Two-year-old Class to "Sportsman" by "Outfit." On the present occasion the tables were turned, and "Sportsman" was not noticed; while Mr. Turner's "Lord Brampton" by "Mr. Winkle," who won at Islington, was now third. With good luck, "Mikado" should grow into a nice horse, as he has capital limbs and an excellent back, while he also carries his head well. Another very nice colt was Mr. Elliott's "Alpha" by "Omega"; he is a nice, short, coupled horse, and with another year over his head should do well. Mr. Martin's "King Cole" by "Fabius" will rank in the light-weight division, as he has not very much bone. If the Three-year-old Fillies were less numerous than the colts, they nevertheless made up a capital class; but when the awards were distributed, it was found that the Judges had disagreed with those at Peterborough, and that several fillies which had won premiums at the Spring Show at Islington were not accounted worthy of prizes at Windsor. At Peterborough Mr. Miles's "Princess" by "Pero Gomez" (a horse who has been more successful as a hunter sire than as a sire of racehorses) was first, and Mr. Martin's "Lady Colin" by "Fabius," were first and second respectively; but at Windsor "Lady Colin" gained the First Prize and "Princess" was nowhere.

Mr. Sanders's "May Morn" by "Theologian"; Mr. Martin's "Miss Florence" by "Fabius"; the same owner's "Lady Colin," aforesaid; Mr. Godson's "Improver" by "Outfit"; Sir Thomas Lennard's "St. Ebba" by "St. Peter"; Mr. Miles's "Princess" mentioned above; and Major Dent's "Florence" by "Spendthrift"; were shown at the Islington Spring Show,

where the five premiums of 15*l.* each were awarded to "Florence," "Improver," "Lady Colin," "May Morn," and "Princess." None of these, however, with the exception of "Lady Colin," found their way into the prize list at Windsor, from which it would appear that Lord Middleton's "Modesty" by "Peppermint," and Mr. Hutchinson's "Portia" by "Ex-minster," placed second and third respectively, were superior to the remainder of the Islington premium-winners. It may also be remarked that in the Two-year-old Class at Nottingham last year "Princess" and "Modesty" were second and third, so that while the latter has advanced a stage, the former has dropped out. There is no getting away from the shapeliness of "Lady Colin"; her shoulders are as good as one would wish to see; her quality should make her valuable in the eyes of men who do not ride over about thirteen stone, and she appears to carry her head in the right place.

Two-year-olds.—The effect of generous keep was at once apparent when the two-year-old geldings were led into the ring. They might easily have been mistaken for three- or four-year-olds, so well grown were they; and it could not be said of them, as Cuthbert Shaw wrote of Dr. Johnson, that they were "unblest with outward grace," for a better-looking collection never paraded before Judges. Mr. Wilkinson's fine chestnut "Rufus" by "Outfit," who won at Peterborough, followed up his former victory in accordance with the forecast of the ring-side critics, as there was nothing in the class to touch him in point of length and liberty, while as to weight fourteen stone should not be too much for him by the time he is old enough to make acquaintance with hounds. Of every colt in the ring words of praise might be written, and the Judges bore testimony to their all-round excellence by inclusive commendation. The two-year fillies are unlikely, in the future, to add to the number of weight-carrying hunters, a general likeness being a marked feature of the whole; but the class had the distinction of furnishing the best hunter mare in the five classes devoted to them. This was Captain Fife's "La Charité" by "Huguenot," that good-looking chestnut sire who till his death was one of the Compton Stud in Dorsetshire, of which establishment Captain Fife is the head. She was up to more weight than anything in the class, walked exceedingly well, while he who could pick faults in her make and shape would be hypercritical indeed. She was bred by a farmer at Shepton Mallet, and was bought by her present owner at a not extravagant price. As bearing upon the future of hunter-breeding, these classes for fillies are necessarily watched with intense interest, and while offering my humble praise of

those shown at Windsor, I may, I hope, be pardoned for repeating what I wrote in connection with the mares of mature age, viz. that fifteen- and sixteen-stone hunters must not be expected out of any of the two- or three-year-old fillies.

Yearlings.—There were nearly forty of these entered—the sexes were mixed in this class—and they were invested with peculiar interest from the fact that the opportunity was now for the first time afforded of seeing whether any of the youngsters were sired by the winners of the premiums given by the Royal Agricultural Society for the first time at Newcastle in 1887. As a matter of fact two only of the Newcastle winners were represented, they being “Knight Templar” and “Storm Signal”; but neither of the youngsters by them found their way into the prizelist. Mr. Martin’s “Oliver Cromwell” (own brother to “Olive Cromwell” shown in the Two-year-old Filly Class) came to Windsor with the distinction of having won at Peterborough, but he was beaten by his stable companion, “Dorothy,” to whom Third Prize was given, the first rightly enough going to Mr. Sherratt’s fine-grown colt by “Vibration,” whose hocks were his worst point. The breeding classes may be dismissed with the remark that there should be some excellent stock in future years, and that the standard is now considerably higher than it was even a dozen years ago. If we could have but seen the names of more tenant farmers in the catalogue there would have been still greater cause for satisfaction.

Hunters Ridden.—The remainder of the hunters were ridden. In comparison with last year the four-year-old geldings were numerous, there being thirty-four against the nineteen of 1888; but two of them only, viz., the Stand Stud Company’s “Pilgrim” and Mr. J. T. Robinson’s “Vanquish,” competed as three-year-olds at Nottingham; and, curiously enough, these two were next to each other in the catalogue then as now. Mr. Ernest Brown is always formidable in the Hunter Classes, and on the present occasion followed up many earlier successes by taking the first two prizes with “Sunshine” by “Garston,” and the “Marquis” by “Zingari.” The former’s colour, a golden chestnut, and his superior condition were in his favour; and he is also up to more weight than the “Marquis,” bred by the Marquess of Waterford (described by the exhibitor in the entry form as “breeder unknown”), and who has not long been taken up. Consequently, he does not at present carry much flesh; but in the course of the season he has taken several first prizes; he shows plenty of quality, and moves after the fashion of a thoroughbred one. Mr. Mitchelson’s “Prophet” also moved in good form; but between these three and the rest of the class

there was something of a gap, and so the class as a whole cannot be said to have exceeded respectable mediocrity.

The Four-year-old Mares, however, fell short of even that standard, for when the Judges had given the First Prize to Mr. Lett's "Magnet" by "Conductor," there was nothing in the small class deemed of sufficient merit to receive second and third honours, which were accordingly withheld.

The twelve-stone hunters made a grand show on paper; but there was a considerable number of absentees. Those, however, who did come into the ring made up quite an average class. Mr. Richardson's "Tommy Giles," by "Tally-ho," the hero of Islington and Peterborough, had not recovered from the illness which overtook him at the latter show; he cantered round the ring in evident pain, and went rather short into the bargain. The Judges, however, could not get away from his make and shape and his quality, so another First went to him after what appeared to be a close contest with Mr. Ernest Brown's "Chance" by "Knave of Hearts."

Twenty-five weight-carriers up to fifteen stone looked well in the catalogue; but, as was the case in several other classes, the numbers dwindled away in the ring. Mr. Richardson had left "Tommy Giles's" stable-companion, "Coronet," at home; Mr. Battams, whose Devonshire stable always contains something upon which modern Daniel Lamberts can ride in comfort, was unrepresented; and several other well-known owners had not sent the horses they had entered.

It is easy to give an explanation of so many stalls being empty. Owing to the obvious necessity of knowing some time beforehand for how many head of stock of all kinds shedding must be erected, and—in the case of horses—boxes and stalls built, a comparatively long period has to elapse between the closing of the entries and the opening of the Show; and during the interim many things happen to induce an owner to change his mind. In the case of dealers, amateur "copers," and those who make showing an integral portion of their lives—and these really find about three-fourths of the hunters—the horses entered are frequently sold before the day of exhibition arrives; or, where this is not the case, the horse may have gone amiss.

The judging of those that were present, however, resulted in the recognition of the merits of a mare who, on the whole, has experienced rather bad luck at shows, viz. Mr. R. N. Byass's "Tormonite," Irish-bred, by "The Lawyer." A man whom she could not carry has no business on horseback at all, in the hunting-field at all events; and as she moves quite in hunter fashion, and appears to be an exceedingly comfortable mount,

substantial justice was done when she was placed first, in front of Mr. Arthur Byass's "Regal," who won in the heavy-weight class at the Islington summer show.

The report of the Hunter Judges is appended:—

Report of the Judges of Hunters.

[Classes 1 to 11.]

We are of opinion that the exhibits in Class 1—*Hunter Mares and Foals*—were decidedly better in every respect than usual, both as regards substance and quality. The whole Class was Highly Commended.

CLASS 3—*Three-year-old Geldings*—deserves special mention; we think it the best Class that we have ever seen in any show-ring. The first three horses we consider will grow into very valuable hunters.

CLASS 4—*Three-year-old Fillies*—was good throughout.

CLASS 5. *Two-year-old Geldings*.—The whole Class we consider of great merit.

CLASS 6. *Two-year-old Fillies*.—This Class was somewhat light of bone all through, with the exception of the first and second, the former, No. 120 (Captain Fife's *La Charité*), being far above the average, and winning Her Majesty's GOLD MEDAL for the best mare in Classes 1, 2, 4, 6, 7.

CLASS 7—*Yearlings*—was the most numerous we had before us, and was most meritorious in all respects; there were many deserving of notice to which we were unable to give prizes. The whole Class was Highly Commended.

CLASS 8—*Four-year-old Geldings*—was of ordinary merit.

CLASS 9. *Four-year-old Mares*.—We are sorry to say that we were unable to award Second and Third Prizes, on account of want of merit.

CLASS 10. *Mare or Gelding, up to Twelve stones, foaled previously to the year 1885*.—A fairly good Class all through.

CLASS 11—*Mare or Gelding, up to Fifteen stones, foaled previously to the year 1885*—was deserving of praise, many very valuable horses being shown.

JOHN BLENOWE COOKSON.
J. MAUNSELL RICHARDSON.
JOHN GUBBINS.

COACH HORSES.

Taken all round, the coach horses at Windsor were not a phenomenally fine collection, though the presence of a few superior animals tended to redeem some of the classes from what would otherwise have been simple mediocrity. In fact, the collection at the Royal Show can scarcely be regarded as entirely representative of the best specimens of the breed to be found. One reason, no doubt, is that many of the purest mares belong to small farmers in the dales, and they are not willing to incur the cost of sending to a distant exhibition; whereas at small local shows they muster in great force. Nevertheless, the Cleveland bay is entitled to respect, for he has an individuality of his own. Scan a Cleveland bay, or his near relation the Yorkshire

coach horse, as narrowly as you please, and you will soon see that, in many material points, he bears no resemblance to the thoroughbred or hackney; and in looking over the coaching classes, shoulders, backs, loins, and quarters must not be regarded as though one were examining a hunter. It is further necessary to bear in mind that the Cleveland bay's mission in life is not to trot a mile in three minutes in a buggy or dogcart, but to comport himself with stateliness and dignity in the rarely seen Cee spring chariot and the full-sized landau. I must not, however, be understood to even suggest that the Cleveland bay has no pace, for the speed at which the Royal carriages invariably travel sufficiently proves the contrary; but his chief use is for harness work, where action, imposing appearance, and strength are required.

In the absence of any ground for coming to a different conclusion, the already promulgated theory may be accepted that the Cleveland of to-day is descended from a breed of horses indigenous to the locality in which they are now reared; and one must be content to leave it in doubt whether the breed was founded or modified by Eastern blood, or by native mares being crossed with Carthaginian sires in the distant past—questions which are not very important after all. It appears to be an acknowledged fact, however, that the Cleveland bays were originally nearly related to the draught horse; indeed, we find that in 1847 “an aged cart stallion of the Cleveland breed” was commended. It is scarcely necessary here to attempt to trace the various steps by which the Cleveland has become a lighter horse than he used to be. The reason for whatever change may have taken place may probably be shortly summed up by the statement that various crossings have been resorted to, just as in the case of Exmoor ponies, and even of the thoroughbred himself in bygone times.

In the annals of the breeding of Clevelands, however, the names of “Tommy” Masterman, Richardson of Loughborough, Wetterill and Dunsley of Irton are household words, and in the days of “Summercock,” “Dart,” “Yatton Lad,” the “Hob Hill horse,” or “Skyrocket,” Clevelands were possibly at their best, though it must not be left unsaid that Mr. James Lowther has always espoused the cause of this particular breed, and that several farmers in the dales about Whitby have clung to their favourites with the utmost tenacity. But there was a period when the Cleveland was unfashionable, and he was beaten in the race for competition by the Clydesdale, which the Northern breeders had brought to a state of great perfection. A good many farmers were not proof against the foreigner's gold, with the result that

whole shiploads went to Germany, until the Americans became buyers; and I have heard it stated by competent authorities that, before the inauguration of the stud-book, the foreign demand did much to keep the breed alive.

That Clevelands had not honour outside their own country sixty years ago seems plain from a letter written by Mr. J. Floyd Baker, a Gloucestershire agriculturist of some note, to Mr. Thomas Raymond Barker. The first-named gentleman, having a fancy to have his farm-work done by a somewhat lighter and more active animal than the draught horse in common use, bought a Cleveland stallion to cross with Gloucestershire mares, as clean-legged as he could get them. The produce he liked, but none of the farmers in the district would put their mares to the Cleveland horse, though he stood $16\frac{1}{2}$ hands high, measured $9\frac{3}{4}$ inches at the pastern, 10 inches below the knee, 21 inches round the arm, $15\frac{5}{8}$ inches round the knee, and girthed 6 feet 10 inches. This was in the year 1827; but on looking through a back number of this Journal, I find that a hostility to Clevelands was entertained by some people in 1860, as, in writing on the Canterbury Show, one of the Judges thus expresses himself: "For hunters the worst cross is that with the soft and specious Cleveland bay. Even Ireland . . . is now debased and half-ruined by this flat-catching strain." Could the writer, however, be confounding Clevelands with Clydesdales? Against this we have the dictum of Mr. T. Parrington, one of the first authorities, that "the Cleveland is the foundation of half-bred breeding," and it is a fact—sometimes unknown to the owners—that a certain number of the best hunters known have Clevelands for their dams. At any rate, for the present he is, and in the future will be, well cared for, as the outcome of a meeting held at Stockton-on-Tees on January 16, 1884, under the presidency of Mr. Thomas Parrington, was the establishment of the Cleveland Bay Horse Society, of which Mr. H. Scarth Dixon, whose recent work, the *North Countree*, contains a good deal of gossip and information anent the Cleveland bay, is secretary.

A near relation of the Cleveland bay is the Yorkshire coach-horse, which, in spite of its Society, of which Lord Wenlock was the first President, can scarcely be deemed a distinct breed, inasmuch as it is admitted that a strain of fresh blood is required every now and again to counteract the natural tendency to become leggy. The opinions of a Southerner are obviously of little worth, but I confess to being unable to quite understand where Cleveland bays and Yorkshire coach-horses begin and end. Mr. Burdett-Coutts, M.P., has recently published an elaborate cata-

logue of his Brookfield Stud; and in the description of his famous horse "Sultan," the contention put forth by Mr. Pease in the columns of the *Field* that "Sultan" was not a pure Cleveland receives confirmation, as several of his ancestors are entered in the books of the Cleveland Society as well as in that of the Yorkshire Coach-horse Society. Mr. Burdett-Coutts also remarks "What, then, is 'Sultan'? Why, he is simply the best type that can be produced by either breed or by both combined. And it is perfectly obvious that he has been produced by a constant crossing and intercrossing of both these breeds, which have no other title to separation from each other than their inability to produce anything like 'Sultan,' if that separation is maintained. The Cleveland bays, in what I may call their aboriginal form, are agricultural horses, with plenty of grand points in their frame, but with no elegance of 'turning,' and without action, and therefore totally unfitted to produce, from themselves alone, the big carriage-horse. The Yorkshire coach-horses have both the qualities above referred to, but they again, if kept to themselves, will in a short time become high in the leg and light of bone, and consequently equally unfitted to draw the weight of a big barouche or a state coach." After reading this, one naturally asks one self why "Sultan" should be in either book?

By some critics it has been objected that the Royal Agricultural Society did wrong in not dividing Cleveland bays and Coach-horses; but if the breeds must needs be mixed up as Mr. Burdett-Coutts asserts they are, the Society appears to have done the common-sense thing in declining to discriminate betwixt Tweedledum and Tweedledee. At the same time it is but fair to say that many good judges are in favour of the two breeds being kept distinct at shows; but whether it was altogether wise to have two separate books is a matter upon which, I gather, there are two opinions.

Be this, however, as it may, there can be no doubt that Mr. Burdett-Coutts's "Sultan"—be he Cleveland bay, Yorkshire coach-horse, or a combination of the two—stood out in front of every other horse in his class by reason of his make and shape and truly magnificent action; and he won for the third time in succession at the Royal. My own idea is that nine out of ten horses seen in the Coaching Classes fail in having such poor middle pieces; but no such exception, in his present condition, can be taken to "Sultan," who has improved greatly about the loins during the last year. Mr. Kitching's "Primus," the winner in the Two-year-old Class, I take to be a very good specimen of the young Cleveland, and his merits were recognised later on, when he gained the distinction of being the

Reserve Number for the Gold Medal. None of the class, however, were remarkable for action; though possibly in days to come the breaker may be able to work some improvement in this respect. The yearling stallions were also deficient in action as well as in bone.

This gives me a convenient opportunity for remarking that the majority of men who show horses in hand are not quite up to the work, and might learn a useful lesson from the runners at Tattersall's or Aldridge's. No horse can do himself justice when his head is hauled round to one side, or when he is checked at every stride; yet at every show in England horses are to be seen in charge of unskilful runners, many of whom turn round and look their charge full in the face, than which nothing is better adapted to make a horse show badly.

The coaching or Cleveland mares and foals were perhaps the best class in this department of the Show. Unlike the breeders of hunters and racehorses, those who rear Clevelands like the mares to foal late in the year, and to this cause must be assigned the paucity of entries, which were five only. Mr. Kelsey's "Patience," by that excellent sire "Wonderful Lad," is a very shapely mare, especially good in front, and if she had a trifle more bone it would be difficult to pick a fault in her. Many a prize has she won, and on the present occasion she was first in her class, and obtained in addition the Queen's Gold Medal, while her foal is a promising one. The winner of the Second Prize, Mr. Horsfall's "Annie," has more bone than "Patience," and moves well. The winner in the Three-year-old Class was never in doubt, as Mr. Bamford's "Princess Maud" was a long way better than anything shown against her. She has a better middle than the others, and moved in good style. There were but two two-year-olds, and the Second Prize was withheld. The solitary prize awarded fell to Mr. Horsfall's "Hazard," a well-grown filly, not at all leggy, and with a good body. The yearlings struck one as not being particularly strong, and there was certainly one in the class which could claim the credentials of neither Cleveland nor coach-horse. This was Mr. Barnett's chestnut filly "Surprise," by "Burnaby." She would make a good dog-cart mare, as her dam was, but it may be questioned whether there is much Yorkshire blood in her veins.

Before dismissing the Cleveland bays and Yorkshire coach-horses, it is somewhat curious to note that nowhere, so far as I have been able to ascertain, is any mention made in coaching history of either of these breeds, not even in connection with the north roads. We find notices of blacks, greys, and chestnuts, which obviously could be no relations to the Cleveland bay, and

we are told of the thoroughbred, or nearly thoroughbred, teams which were employed on certain fast stages. But of the breeds under notice we hear nothing, which is certainly a curious circumstance, because one would think that the northern contractors would have largely made use of a breed which has always stood high in the affection of Yorkshiremen.

Report of the Judges of Coach Horses.

[Classes 12 to 18.]

CLASS 12. *Stallions foaled previous to the year 1887.*—The First and Second Prize horses have very superior action. The FIRST PRIZE horse, No. 259 (Mr. Burdett-Coutts's *Sultan*) was afterwards awarded the Queen's GOLD MEDAL.

CLASS 13. *Two-year-old Stallions.*—This was a large but only moderate Class, with great want of action. No. 278 (Mr. John Kitching's *Primus*) was RESERVE NUMBER for the GOLD MEDAL.

CLASS 14. *Yearling Stallions.*—This was but a moderate Class. The FIRST PRIZE, No. 292 (Mr. John White's *Duke of Wellington*), was a good animal and an easy winner. There was again great want of action, and many of the horses had small bones and weak pasterns.

CLASS 15. *Mares and Foals.*—A very good lot. No. 301 (Mr. Thomas Kelsey's *Patience*) was afterwards awarded the Queen's GOLD MEDAL.

CLASS 16. *Three-year-old Geldings or Fillies.*—No. 304 (Mr. Henry Bamford's *Princess Maud*) is a very good mare with superior action, and was afterwards RESERVE NUMBER for the Queen's GOLD MEDAL.

CLASS 17. *Two-year-old Geldings or Fillies.*—Only one exhibited.

CLASS 18—*Yearlings*—was only a small Class. No. 314 (Mr. John White's *Lady Danby*), the FIRST PRIZE, was a good animal.

GEORGE WOMBWELL.
JAMES RUTHERFORD.
CLEMENT STEPHENSON.

HACKNEYS.

Even to the untrained eye there is a great deal of the poetry of motion in a horse "trotting of his own courage without force of spurs," as the writer of one of the Paston Letters phrased it prior to the year 1480. At Windsor there were many horses which Margaret Paston would doubtless have described in the above words, and which Sir John Paston would have bestridden with discerning pleasure as doing infinite credit to the county breed—for Norfolk has, from the time whence the memory of man runneth not to the contrary, been noted for its horse, which, though known by a variety of names, has ever been a trotter. One horse in the class attracted attention, and that was the Hon. Arthur Cole's "Recruit" by "Cadet." On his first appearance he did not make a very good show, but when settled down he strode along in excellent style; and as he shows a good deal of quality, and is a nice, well-made horse, with

good, if not actually super-excellent, shoulders, he should be worth following.

The English hackney is indeed a horse with a history, and that history has been so fully given by Mr. Henry F. Euren (the secretary of the Hackney Society), in the first volume of the *Hackney Stud-book*, that there is little need to say much about it now. It is, however, clear that in the distant past when gallopers were rare, and roads on which galloping could be indulged in still rarer, a horse that could trot over open ground had a value of its own; the "horse fit for plough and teams," as the old writer FitzStephen designates him, would, of course, not answer the purpose; and so there has been, as Mr. Euren says, for "at least 700 years a *breed* of trotting horses." The same writer also tells us that the oldest surviving appellation for the active riding horse in this country is "nag," derived from the Anglo-Saxon *hnegan*, to neigh. "When the Normans became our masters they introduced their own more familiar term *haquenée*, or *hacquenée*, the French word derived from the Latin *equus*," and it appears that in 1303 the word had been anglicised, as "Robert Mannyng, more commonly known as Robert de Brunne, from his being a monk at Bourne, in Lincolnshire, who wrote in that year, uses it in the line 'Ilk on his hakneye.'" However, the trotter held his way, and became more valuable as pace increased and roads became better; but the introduction of railways and the running of "market trains" rather discounted the hackney, and farmers—at least, a great many of them—took to breeding hunters instead. The last link in the history of the hackney is that in 1878 a proposition was made that a register for English trotting horses should be established; the Hackney Society came into being in 1883, and has been of infinite service to hackney breeders.

It is, perhaps, worthy of note, now that the expediency of breeding ponies from Arab sires is being eagerly discussed, that from time almost immemorial there has been more Eastern blood in the north and east of England than in any other district, and in both the Yorkshire and Norfolk horses there is a strain of Eastern blood, while some good judges are in favour of a further infusion; and just as an exported thoroughbred was the foundation of American trotting stock, so was the blood horse the father of English trotters, as either "Blaze" or "Blank"—Mr. Euren thinks the former—was the sire of "Shales's or Shield's horse," the first noteworthy trotting hackney stallion of the modern type.

Although hackneys are now such an attractive feature at the Royal Agricultural Society's Shows, there was no distinct

class for them till the year 1848, except in 1840, when the Show was held at Cambridge. Being on the border of the hackney-breeding territory, a class for roadsters appears to have come in under the head of "Extra Stock"; but it was added by the local committee, and the prize awarded to Mr. Taylor's "Norfolk Phenomenon." In 1848, too, the class for roadster stallions was the work of the local committee; and it was not till 1851, the first Windsor year, that the Society itself included hackney stallions in its programme; but it was cut out in 1855 (for that year only) when Carlisle was visited.

There was certainly a grand collection of hackney sires at Windsor, and some very notable horses were brought into competition with each other. Among them were Mr. Henry Moore's "Rufus" by "Vigorous," who suddenly trotted into fame at the Spring Show at Islington, on which occasion he took champion honours in a large class; and to "Rufus" the ringside critics were unanimous in awarding first place in the class for those exceeding fifteen hands in height, and foaled in or previous to the year 1886. Much might be written in praise of Mr. Moore's horse. He shows great quality, and has fine action, moving behind as well as in front; but his shoulders might possibly be better, if, that is to say, riding qualifications are to have any weight. "Rufus," however, was put third, a decision which did not meet with the approval of the East-countrymen present. Mr. Miles's "Excel" was placed first, and Mr. Walter Gilbey's "County Member" second; and these, as it happened, were first and second at the June Show at Islington, at which, however, "Rufus" was not a competitor. Although the placing of this class, and perhaps one or two others, did not commend itself to some of the onlookers, the classing was at least consistent, as it was evident the Judges inclined towards big and powerful horses; while, as will be seen from their appended report, they selected as prize winners those animals which in their opinion most nearly answered to the requirements of a ride-and-drive horse; and for them good feet are surely important. Mr. Lewis's "Tip-top Shot," by "Great Shot," is a troublesome horse to deal with in any company; one cannot get away from his symmetry and fine action; but, on the other hand, he does not fill the eye as being quite a hackney. To begin with, he is very light of bone, and were one asked to give a rough description of him, the words "a fine-actioned cocktail" might convey a tolerably accurate definition of his general appearance.

I have always thought that if "Tip-top Shot" could have a collar thrust over his shapely head, and be harnessed forthwith to a victoria or miniature brougham, his owner might safely

defy competition with any horse of the kind in London; but when we come to the qualifications for a hackney sire different considerations must prevail. The Judges at Windsor gave him the Reserve Number, and in so doing they paid him the compliment of acknowledging his beautiful action without doing a monetary injustice to those which answered more truly to the approved type of hackney. In the 15-hand Class Mr. John Robinson's "Young Lord Derby," who must be taken to represent the harness, and not the saddle, division, added one more to his many victories. On the Windsor judging, Mr. Mitchelson's "Star of the North," by "Sir Edwin Landseer II," must be taken to be superior to any of the two-year-olds shown at the Islington Spring Show, inasmuch as he beat Lord Walsingham's "Felicity" and Mr. Lewis's "Enterprising Shot," who were respectively first and second at Islington, together with some others shown there; but in other respects the two placings differed. Mr. Walter Gilbey's "Glendale," for instance, who was highly commended at the Hackney Show was now second, one place in front of Lord Walsingham's "Felicity," who was first at the Spring Show; while at Hull "Glendale" was first in the Two-year-old Class. With respect to the Windsor winner, "Star of the North," however, it may be said that he is a fair mover, though his hind action is not by any means equal to that of his forelegs, which is decidedly of a peculiar nature: the hoofs seem to dwell in the air and to come to the ground with a lightness which would scarcely break an egg.

The first three in the Yearling Class were at Islington in June, and both sets of Judges agreed in putting Mr. Burdett-Coutts's "Beau Lyons" by "Candidate" first; but Mr. Anthony's "County Alderman," who was third at Islington, now advanced a stage, in the absence of Mr. Moorhouse's "King Bruce"; and Mr. Burdett-Coutts's "Master Fireaway," who was highly commended in London, was third at Windsor; so when it is taken into account that these horses were, on the whole, very much after the stamp of those selected as prize-winners in the previous Classes, I venture to suggest that a good deal of the fault-finding to which the deposition of "Rufus" gave rise was unnecessary. The Judges took their own line, as sportsmen should, and in the Class last mentioned agreed with the same Judges who gained such *kudos* at Islington by promoting the comparatively unknown "Rufus" over the heads of well-tried horses.

Brood Mares and Foals.—With three entries in the Class for Hackney Mares above Fifteen Hands, H.R.H. the Prince of

Wales unfortunately missed all the prizes. His "Lady Florence," by "Reality," is a well-turned mare so far as her forehand is concerned, but is deficient about the quarters; though her foal, by "Master of Arts," was worthy of notice. Of a rather better stamp is "Rosebud," by "Denmark," a well-topped mare of quite the hackney stamp, with a nice foal by "Rufus"; but unquestionably the best in the class was the Stand Stud Company's roan mare, "British Queen," who a few years ago used to excite admiration and win prizes in harness classes. She still retains much of her old action, and, if like begets like, her foal, which was but a fortnight old on the judging day, should turn out a good one, the foal, by the way, being by the Company's sire, "Star of the East." The winner of the Second Prize, Mr. Holtby's "Camilla," by "Dorrington," is by no means bad to follow, while Mr. Champion's "Jane," who gained the Third Prize, if a somewhat plain mare, is not without her good points. Of those between fourteen and fifteen hands Mr. Moore was first with "Frisk," by "Lord Derby II.," a nice mare, only there is not very much of her, and it must have been a near thing between her and the Prince of Wales's "Constance," by "Cannon Ball," who ran second; and were it not that she is a trifle short in front the positions might have been reversed, as there was little to choose between the style of going of the pair.

Fillies.—In the Three-year-old Class Mr. Burdett-Coutts's pair "Silver Belle," by "Wildfire," and "Lady Alice," by "Fimber Fireaway," held their own. In the eyes of the Judges at the Islington Spring Show "Lady Alice" seemed the better, as she was first in her class, securing in addition the Champion Cup, the Victoria Challenge Cup, and Silver Medal. At Windsor this placing was reversed, as "Silver Belle," who is said to have cost 250 guineas, was placed before "Lady Alice," whose purchase-money is reported to have amounted to 450 guineas, and for whom 1,000 guineas is rumoured to have been offered in vain by a French buyer who coveted this shapely filly. In the Two-year-old Class first honours fell to Mr. Moore's "Modesty," by "Lord Derby II."

Hacks.—The classes for hacks and harness-horses generally appear to be a sort of Tom Tiddler's Ground wherever riding and driving men and horses meet; and, besides picking up gold and silver in the shape of prizes, there is generally a nice little argument as to what constitutes a hack. Nobody appears to me to know exactly what a hack is; nor, according to the present condition of Classes, are Judges quite sure what to select. The judging of hacks, therefore, appears to be a matter of individual opinion, leavened with the general understanding

that you must have action. Most deferentially, too, would I submit that in the case of the hackney stallions it would be as well if the Hackney Society and the promoters of the principal shows were to come to some understanding as to the chief points to be regarded in judging the sires. Are they to be judged as sires for riding-horses, or as sires for harness-horses, or as the begetters of general-purpose horses? The hackney breeder will probably say that neither view must be taken; but that a hackney must be judged as a hackney, just as hunters, cows, bloodhounds, or fancy pigeons are judged. This is all very well as far as it goes; but, as at Windsor, it occasionally leads to inconvenience: because, though in theory there may be but one type of hackney, there is no doubt that some are more like riding-horses than others, while others are more adapted for harness work. Nor must it be forgotten that, whatever the theory may be, the majority of men prefer to ride something by a blood-horse, when they put their hands in their pockets to buy for themselves; and in what follows I trust the reason of this digression will become apparent.

The show hack is almost the creation of the Horse Show, and in the 15-stone Class we were face to face with some fine specimens, but which, nevertheless, were not all of them hacks in the eyes of everybody. Possibly the statement may stand that there are but two sorts of hacks: one for doing long journeys—the old roadster, in fact—the other for park use. If that be so, let us see how far the show hack is adapted to fill either situation, and whether the manner of showing him is calculated to bring out his points. In the 15-stone Class at Windsor the First Prize went to Mr. John Robinson's "Lady Isabel," and the Second to Lord Londesborough's "Ophelia," who also had fine action. She was indeed the superior of "Lady Isabel" in most particulars, but was scarcely equal to the stipulated weight. Now, to which of the Classes—roadster or park hacks—do these two, not to mention Mr. Waterhouse's "Princess" (formerly Mr. Robinson's), or Mr. Mark Pearson's "Lady Marton," belong?

The need for a roadster no longer exists, and, in accordance with the inexorable law of supply and demand, the old-fashioned roadster is difficult to find; and, when found, might not perhaps gain many prizes in hack classes at shows—he would not step high enough. But were "Lady Isabel," "Ophelia," and the other winners roadsters? Suppose any of them were ridden thirty miles in three hours, and ridden back next day at the same pace; how long would their legs stand the work with such high action? Then as to their park-hack qualifications. If they be park hacks, why in the name of fortune should they be

hustled round the ring at a pace which if indulged in in the Row, except at the hour at which the "liver brigade" take horse exercise, would lead to an interview with the magistrate of the district? It will of course be urged that this is only done to show the Judges what the horse's best pace is like; but, on the other hand, one may ask why no show of manners is ever ventured upon.

It may be admitted that the park hack may have action—extravagant action if the rider pleases—but he should also be temperate and handy, which, speaking broadly, comparatively few of the show hacks are. In short, action counts for too much, and manners for too little. Some years ago Mr. James Sudbury, of Norwich, was a regular exhibitor in hack classes, and his *spécialité* was well-mannered horses, with true, level action, but not particularly high. I think that the last one he exhibited was "Old Times," a bay. On him Mr. Sudbury, who must have ridden about sixteen stone, would trot round the ring at about six miles an hour, and would canter as slowly as five miles per hour. All the steppers went flashing by him at every stride, yet nothing upset "Old Times'" dignity. If I remember rightly, he was not very successful in taking prizes; and of late years Mr. Sudbury has not shown at all. Yet it was not for a high-stepping tearaway horse that Mr. Anderson, the once famous dealer of Piccadilly, asked the late Sir Robert Peel an enormous price. It was for a staid weight-carrier with perfect manners; and had Sir Robert paid the price it might have been well for him, as he eventually died through injuries sustained from a fall off a coarse, fidgety animal, purchased for him, for eighty-five guineas, by his friend Lord Ossington, then Mr. Denison.

It might possibly be a move in the right direction if the conditions for hack classes were recast. On looking through some old catalogues I find "Hacks or roadsters—quality and action essential" (this is surely an impossible combination); "blood hacks and ladies' horses; a class for hacks, cobs, and ponies; hacks or covert hacks." Now a judge may well feel bewildered on finding himself expected to act under such vague orders. It might be better to state in the conditions whether the classes were for roadsters, park hacks, covert hacks, or what; as the judges could then pass over any horse which in their opinion did not answer to the requirements, whereas at present the conditions are wide enough to justify them in awarding the First Prize to the grandest of all, regardless of the duties he may be called upon to perform. These points have been dealt with somewhat at length because it seems to the writer that

under the present system the well-bred, well-broken, and well-mannered park hack, the horse upon which men and women like to ride, is at a discount at shows, and a tearing, shaking, short-and-wide animal is the only one which obtains prizes, save on very rare occasions, as at Bath, for instance, a few years ago, when the Judges passed over all the steppers and gave the prize to a thoroughbred chestnut, the property of the late octogenarian proprietor of the Plymouth theatre; but a storm of indignation arose over the decision. In connection with high-stepping hacks, there was much sense in the criticism of a foreign gentleman who was present at one of our principal shows. "Are they not splendid horses?" asked his friend, when the hacks came into the ring, "would they not look well in the Bois?" "They are very fine," was the reply, "they trot much—but they do not proceed."

Subject to these remarks no exception can be taken to the hacks decorated at Windsor. Of the Fifteen-stone Class mention has been made; while in the Twelve-stone Class the first place was filled by Mr. Lucas's "Elegance," a high-actioned mare whose form is familiar to all attendants at shows. In noticing the Fourteen- to Fifteen-hand Class it is only necessary to say that Mr. Carey's "Grace Darling" beat Mr. Cogswell's "Lady Sapphire," the best walker in any of the classes.

Report of the Judges of Hackneys.

[Classes 19 to 29.]

In judging Hackneys we selected for breeding animals those we considered most like a general-purpose horse for riding and driving, with substance; especially choosing those with action and good feet, points we consider most essential for a ride-and-drive horse.

We were compelled to place one or two animals lower down in the prize list than their appearance deserved, because in our opinion they were deficient in these points.

The stallion No. 322 (Mr. William Miles's *Excel*) has good action, with plenty of propelling power behind; good shoulders and back, with deep back ribs and excellent feet—points making him in our opinion a good example for a Hackney stallion. The same may be said of No. 411 (Mr. Burdett-Coutts's *Silver Belle*) for a mare or filly.

In the riding classes—*Weight Carriers up to Fifteen Stone*—we had difficulty, because we considered No. 433 (the Earl of Lonsborough's *Ophelia*) was not up to the weight, but she had by far the best action of any in the Class. We thought many of them looked more like harness than riding horses.

In the other two riding Classes very many meritorious animals were shown.

JAMES HORNSBY.
CHARLES PIGOTT.
GERALD STAPYLTON-SMITH.

PONIES.

The introduction of pony classes into the Prize Sheet has already been noted, and these little steeds appear to be growing in favour each year; while, in the columns of the *Field*, an interesting correspondence concerning pony-breeding, in which the claims of Arab sires have been urged, has taken place. But "pony" is now a word of wide signification, including, as it does, polo and racing ponies; though, strangely enough, it is but rarely one sees at a horse show anything except what may be termed the pony proper. In time, however, classes for polo ponies may come; and when the Shetlanders get the stud-book which is now contemplated, it is not impossible that they too may be represented in the show-yard, and so swell the increasing number of ponies.

The chief circumstance to be noticed in connection with the classes for pony sires between thirteen and fourteen hands and twelve and thirteen hands respectively is the signal success that attended Mr. Christopher Wilson's exhibits, for he took First and Second Prizes in each class, with a quartett of ponies that could scarcely be beaten, and achieved the unique distinction of being presented, at the hands of Her Majesty the Queen, with Two Gold Medals, for the best Pony Stallion and the best Pony Mare. Mr. Wilson has long devoted himself to pony-breeding, and in "Pomfret Wonder" and "Little Wonder," the winners in the larger class, he possesses two as nearly perfect as possible. One of them, "Pomfret Wonder," deservedly gained championship honours; while "Snorer" was the pick of the brood mares between thirteen and fourteen hands. As an example of inbreeding, it may be noted that "Snorer's" foal is, according to the catalogue, by its grandsire, the mare and her foal both being by "Sir George." There were several other pony sires good enough to have won at many shows; and it is to be hoped that in the endeavour to breed small thoroughbreds, polo ponies that can race, ponies with an Arab cross, and what not, such strains as were seen at Windsor will not be allowed to die out.

Report of the Judges of Ponies.

[Classes 30 to 37.]

CLASS 30. *Stallions above Thirteen and not exceeding Fourteen hands.*—The FIRST PRIZE, No. 470 (*Pomfret Wonder*), also winner of Queen's GOLD MEDAL, and the SECOND PRIZE, No. 471 (*Little Wonder the 2nd*), were two fine ponies (both the property of Mr. C. W. Wilson). The THIRD PRIZE, No. 466 (Mr. G. M. Nicholson's *Pick Up*), was a nice goer, but crossed his legs. Others in Class nothing particular.

CLASS 31. *Stallions above Twelve and not exceeding Thirteen hands.*—A small Class. The FIRST PRIZE, No. 474 (Mr. C. W. Wilson's *Prince Charlie*), up to weight, with fairly good action.

CLASS 32. *Stallions not exceeding Twelve hands.*—The FIRST PRIZE, No. 478 (Lords A. and L. Cecil's *Tommy*), was a nice pony. The SECOND PRIZE, No. 481 (Lord Londonderry's *Auchendennan*), was also a good pony, but with hardly so much action. Others in Class nothing particular.

CLASS 33. *Brood Mares and Foals above Thirteen and not exceeding Fourteen hands.*—The FIRST and SECOND PRIZE ponies very good, especially the First, No. 492 (Mr. C. W. Wilson's *Snorer*), also winner of Queen's GOLD MEDAL and CHAMPION PRIZE; the Second, No. 497 (Mr. C. E. Cooke's *Lady Jane*), was a very grand mover.

CLASS 34. *Brood Mares and Foals not exceeding Thirteen hands.*—Very bad Class indeed, with only two entries.

CLASSES 35, 36, and 37. *Mares or Geldings.*—Nothing particular to notice.

HENRY FRISBY.
JNO. M. MARTIN.

HARNESS HORSES AND PONIES.

There was plenty of "extravagant action" among the harness horses, although of the half-dozen entered in the class for horses exceeding fifteen hands two inches, a couple only competed—Mr. Burdett-Coutts's "Goldwave" and the Stand Stud Company's "Extravagance," who were placed in the above order. Both are exceedingly fine goers, but "Goldwave" has possibly the more hind action. As only two competed, the Second Prize would in ordinary course have been withheld; but "Extravagance" trod so closely upon the heels of the winner that the Judges begged the authorities to strain a point and give a Second Prize. The Manchester Company, however, scored a First in the next class; and then Mr. Pope's well-known pair, the evergreen piebald mare "Magpie," to whom winning at the Royal is no novelty, and the faultless pony "Fanny," gained a First each, and this brought the light horses to a close.

Among the saddle ponies were plenty of old acquaintances, and it was not difficult to foretell the victories of the Stand Stud Company's "Shooting Star," or Mr. Clifton's "The Prince," in their respective classes, while the curiosity of the pony section was the Countess of Hopetoun's tiny little Scotch-bred "Rose."

Report of the Judges of Harness Horses and Ponies.

[Classes 38 to 41.]

CLASS 38. *Mares or Geldings above Fifteen hands two inches.*—Only two exhibited; the FIRST PRIZE, No. 534 (Mr. Burdett-Coutts's *Goldwave*), is a very good animal, with plenty of quality and good action. We considered the only other exhibit (No. 531, the Stand Stud Company's *Extravagance*) fully deserving of the SECOND PRIZE.

CLASS 39. *Mares or Geldings above Fourteen hands two inches, and not exceeding Fifteen hands two inches.*—This was a very good Class.

CLASS 40. *Pony Mares or Geldings above Thirteen hands and not exceeding Fourteen hands two inches.*—Only five put in an appearance: the FIRST and SECOND PRIZE winners (respectively No. 553, Mr. W. Pope's *Maggie*, and No. 555, Mr. J. H. Clifton's *The Don*) were very good animals.

CLASS 41. *Pony Mares or Geldings not exceeding Thirteen hands.*—This Class contained the wonderful little mare, No. 566 (Mr. W. Pope's *Fanny*), perhaps one of the finest goers in the Show.

GEORGE WOMBWELL.

JAMES RUTHERFORD.

CLEMENT STEPHENSON.

SHIRE HORSES.

On coming to the heavy horses, one is face to face with those which were at the foundation of the horse section of the Royal Shows. Before the Society ever dreamed of giving a sixpence in prizes for hunters, hacks, or harness horses, the heavy horse had established himself in the prize list, and for some time had the field pretty nearly all to himself. Indeed, a few sturdy agriculturists, who regard the heavy horses as the mainstay of farmers, and view hunters and steppers in the light of luxuries, were aggrieved, in their patriotism, that the light horses were put first in this year's Catalogue. Possibly one scarcely recognises the wonders achieved by breeders until one inspects all the various breeds to be found in a horse show; and if the eye falls first on the diminutive pony, and then on the massive and gigantic Shire or Clydesdale, the spectator will be the better able to appreciate what breeders have done for our various types of horses.

Each succeeding year, however, tends to show of what incalculable benefit to horse-breeding are the Societies which have, in recent years, been formed to guard with jealous care the interests of particular breeds. In early days, chivalry appears to have occupied the place now taken by the Shire, Clydesdale, and Suffolk Societies in furthering the breeding of heavy horses. Even for saddle-work the thirteen-stone or fourteen-stone hunter of to-day would have been of but little use to the man in armour, as compared with whom the Lifeguardsman riding about twenty stone, with all his "kit," is but a middle-weight. After the Norman Conquest, "rank had its responsibilities"; and, in proportion to the extent of his lands, the "armiger" of the eleventh century had to find a certain number of horses fit to carry a knight in armour. But breeding must have been carried on in a very haphazard fashion in those early times—though, possibly, in horse-breeding, as in other matters, our remote ancestors knew more than we give them credit for—and

perhaps we may now be permitted to wonder how it was that when increased attention came to be paid to the science the raw material was as good as it was.

From time immemorial, England appears to have nourished a heavy and not altogether shapely black cart-horse, the lighter and more active specimens of which seem to have been told off for saddle-work, while the more lumbering ones worked on the land, and dragged heavy vehicles over the tracks which by courtesy were then termed roads. This powerful horse, if not the "Great Horse" in all its purity, was doubtless a very near relation. At any rate, we find cart- and plough-horses mentioned as being on sale at Smithfield as early as 1153 and 1154; and sundry enactments were passed to ensure, as far as possible, the supply of big strong horses. A good deal of fact and a good deal of theory may be used in tracing the history of the heavy English horses; but the truth remains that since the formation of the various Societies an almost incredible improvement has taken place. For this we have in great measure to thank a few breeders of a past generation who had the forethought to preserve records and pedigrees: consequently, when the different stud-books were compiled, there was a mass of voluntarily-kept matter to start upon. It is not, perhaps, a matter of very great importance to attempt to trace the origin of the term "Shire" horse; but in his book on "The War Horse" Mr. Walter Gilbey reminds his readers that the word "Shire" is first used in connection with horses as far back as the time of Henry VIII., when it occurs in a statute passed in the 32nd year of that monarch's reign. The typical black cart-horse seems to have been bred chiefly in Lincolnshire and Cambridgeshire and in the Midlands—that is to say, in Leicestershire, Notts, Warwick, Derby, Huntingdon, and right down to the banks of the Severn. This being for the most part flat country, much of it being on a level with the river-banks, it is not improbable that the term "Shire" was given to this breed because it was indigenous, as it were, to several shires, and to distinguish it from all hill varieties; just as we employ the phrase "mountain ponies" to distinguish them from those varieties reared on the lower ground.

When Arthur Young penned his reminiscences of his tours through England, undertaken at the latter part of the eighteenth century, he only gave prominence to two species of cart-horse, the old black and the Suffolk. That these were the prominent breeds is unquestionable; but in two portions of England, widely distant from each other, draught or agricultural horses were found which bore little or no resemblance to either of

those mentioned by Mr. Young. In Northumberland, for instance, were the Vardys, a type once fondly cherished by the Northern farmer, who, for some inexplicable reason, eventually discontinued breeding a horse with such an established reputation. The Vardys, it is true, lacked the size, and therefore necessarily to a certain extent the power, of the Shire horse; but contemporary writers describe them as being compactly-built animals on short legs, with deep bodies, powerful quarters, and with an utter absence of anything approaching slackness in the loins. They were, moreover, clean-legged, or nearly so, and I have been given to understand that the mares of this breed played no insignificant part in the production of hunting stock, for which Northumberland was at one time famed. In like manner, the clean-legged mare, which once on a time was the only one used for draught purposes in Ireland, made the reputation of the sister isle as a home for hunters, and from that point of view Ireland has materially suffered through the introduction of Clydesdale blood. Then, again, in the West of England there was a somewhat similar variety, more or less related, no doubt, to the pack-horse, of which further mention will be made, which, in its turn, was not unlike the old original Cleveland bay.

Although, in later times, individual judgment and enterprise counted for a great deal, the first systematic attempt to ensure the purity of the Shire breed dates from the establishment of the Shire Horse Society in 1877. The Shire Stud-book has necessarily been an incentive to breeding, and the Islington Shows, of course, tended in the same direction, not to mention the enlargement of the Royal prize-sheet, and the many prizes given by Agricultural Societies. In another direction, too, the above-mentioned agencies have been most valuable—I mean in connection with soundness. About fifty years ago an authority—I think it was Mr. Spooner, the veterinary surgeon—wrote of heavy horses in these words: “The cart-horse differs in structure from the blood-horse, inasmuch as in the case of the cart-horse the bones are actually larger, and there is more bone in proportion to the muscular system than in other horses. In the heavier horses such is the tendency to form bone, that at five years old many of the cartilaginous structures, e.g. the cartilages of the foot, are changed into bone. . . . There is scarcely a dray-horse but what has some ossification of the cartilages of the foot.” Now, though ossification is unhappily by no means an unknown infirmity, the strict veterinary examination to which Show horses are now subjected has considerably weeded out unsound animals, from Show-yards at all events; for whereas, when the Shire Horse Society

held its earlier Shows, about one half of the horses inspected were cast, Mr. Sexton has stated, in the *Live Stock Journal Almanac* for 1889, that at the 1888 Show scarcely more than 20 out of 160 were unable to obtain certificates. It follows that, when sound horses only are used for breeding, the risk of hereditary disease is minimised as far as possible. At the present time, when the veterinary examination is so strict, and even the most elastic-conscienced exhibitor knows the futility of "faking" his horses, it seems strange to read that in 1861, at Leeds, the Judges discovered the feet of one of the heavy horses to be stopped with gutta-percha and pitch.

In tracing the growth of the Royal Show, we can see how the value set upon the different breeds came to be gradually recognised. At the Oxford Show, in 1839, all the breeds were mixed up together, and to the Judges was left the extremely difficult task of saying which was the best animal. What should we have said at Windsor had any set of Judges been asked to assess the respective merits of the best Shire, the best Cleveland, and the best Suffolk, all three being shown in the same class? As will be seen, however, when we come to the Suffolks, the early honours did not rest with the Shire breed—for the reason probably that even fifty years ago they were not so much of one type as were the Suffolks. Nor at the first two Royal Shows were the cart stallions divided into classes according to their ages; this progressive step was not reached till the Liverpool year, in 1841, when prizes for pairs of plough-horses were first offered. By the time York was visited, in 1848, there were five classes for agricultural horses, and here for the first time a class for dray-horses found its way into the schedule. This new departure appears to have been taken because of something which had occurred at Northampton in 1847. When the agricultural horses were judged there, one of the competitors was a gigantic animal which, in the opinion of the Judges, was too big every way for farmwork, but just the thing to draw a brewer's dray, and to be a worthy sire for horses adapted for that work. They thought it a pity that so fine a horse, as well as others built on similar lines, should be debarred from winning prizes, so a class for stallions calculated to get dray-horses was introduced in 1848, but was given up in 1865.

Up to and including the Reading Meeting, in 1882, the Shires had to compete at the Royal Shows in the classes for "Agricultural Horses not qualified to compete as Clydesdales or Suffolks." At York, in 1883, separate classes were first given in the Prize Sheet for "Shire Horses." The Shire men had for some time been becoming a power, and although a good many

people objected to the term "Shire Horse," it was as "Shire Horses" that the old English cart-horse, the Great Horse, or whatever you like to call him, first figured in the Royal catalogues as a distinct breed. At Preston, in 1885, the prizes were for "Shire, or Agricultural Horses not qualified to compete as Clydesdales or Suffolks"; but in 1886, and since, the prizes in these classes have been for "Shire Horses" only.

The Shire Stallions exhibited at Windsor were a strong class, and included some good animals. Lord Wantage's "Prince William," Mr. Duncombe's "Harold," and Mr. Freeman-Mitford's "Hitchin Conqueror" (placed by the Judges in the above order) have met in friendly rivalry before, and if the "poetry of motion" can be said to belong to an agricultural horse, these three may lay claim to it. There was nothing lumbering in the gait of any of them, and none but an expert quick to discern the most trivial point, and capable of weighing its importance, could separate the first two. Possibly it was his action more than anything else which gave "Prince William" the first place. His record is one of unbroken success, as at two years old—that is to say, in 1885—he gained championship honours at the London Show, where he was shown by Mr. J. Rowell, and he has pretty well carried all before him ever since. Mr. J. Rowell—who, by the way, was the owner of the Commended horse "Thumper,"—gave 250 guineas for "Prince William" as a yearling, and subsequently sold him to his present owner.

Considering what were behind "Prince William," it goes without saying that Lord Wantage's horse was declared champion, by right of which he received the Queen's Medal and the 50*l.* given by the Shire Horse Society. The judging for the Championship may be mentioned, because it shows with what anxious care the Judges weighed the merits of the horses brought before them. After "Prince William," Mr. Duncombe's "Harold" was reserved, in preference to the winners in the three-year-old and younger classes—a decision which suggests a very close contest in the aged class in which "Prince William" and "Harold" met.

As compared with the aged horses, the three-year-olds were moderate; and even those of less experience than the Judges were not long in foretelling the somewhat easy victory of Mr. Miller's "Munchausen," a big horse on good legs. The chief Islington winners were absentees, possibly because their season was scarcely over, and they might have scarcely been up to Show form. The two-year-olds, on the other hand, were a good class, with upwards of thirty entries. Here again the winner of the First Prize, Lord Hindlip's "Nailstone Conqueror,"

came into the ring only to add to many previous victories dating from his yearling days. In the matters of size and weight he stood out in front of everything else in the class, more than confirming the promise of last year; and when the more mature celebrities shall have faded away it is not improbable that the "Nailstone Conqueror" (who, by the way, won at Islington in February, when owned by Mr. Pate) may prove a worthy successor to some of them. Mr. Barrs, I believe, bought this horse from the breeder, but passed him on before he had made his mark to Mr. Pate, and it must have seemed rather hard lines to be beaten by one which had formerly been in his own stable; but it was a compliment to his judgment when Mr. Barrs took Second Prize with "Nailstone Standard Bearer," who was highly commended at the Shire Show at Islington.

If "Harold" failed to beat "Prince William" in the first class, he at any rate had the honour of siring the winner in the yearling class, as Lord Dysart's "Witham Prince," an Islington winner, was the best out of a numerous and very good batch; and the saying that like begets like was proved up to the hilt when it was found that the first and second in the yearlings class were sons of the first and second in the aged division. In short, the yearling, two- and three-year-old stallions show that breeders of the future will not lack a wide choice of sires.

Mares and Fillies.—The height of summer is not perhaps the most favourable time for exhibiting Shire brood mares, and it was doubtless owing to weighty considerations that only three mares and foals competed. But they were an exceedingly good three, and after looking at the winner, Mr. Cross's "Kate," any one who did not carry the date of her birth in his head might have been surprised to learn from the catalogue that she was foaled in 1878. Age sits lightly upon her, and her foal by "Harold" did full justice to both sire and dam. The winner of the Second Prize, on the other hand, Lord Wantage's "The Forest Queen," is but four years old, and her great hungry foal by "Prince William" has evidently tried her considerably. Among the mares who had not had a foal in 1889 was Mr. Freeman-Mitford's "Chance," an animal with great weight and substance, a magnificent mare all round, and one could only regret that she is this year numbered among the barren. In horse-showing, as in other matters, nothing succeeds like success; and therefore there was no surprise at "Chance" being first in her class, and at a later stage the recipient of the Queen's Gold Medal and the 25*l.* of the Shire Horse Society, as being the best mare or filly in five classes. Mention should, however, be made of Mr. R. Sutton-Nelthorpe's "Starlight," in appearance quite a different mare

from what she was at Islington. She was an excellent second to "Chance," and is good enough to win in almost any company, with "Chance" out of the way. The Shire fillies were good, though the three-year-olds were not numerous, nine only being entered. The two-year-olds and yearlings, however, were numerically strong; and Mr. Clark's "Moulton Queen," a two-year-old filly, furnished beyond her days, may be singled out for special commendation; while among the yearlings were many who will one of these days, without doubt, make reputations for themselves in the show-ring.

Report of the Judges of Shire Horses.

[Classes 42 to 50.]

The Judges of Shire Horses congratulate the Council of the Royal Agricultural Society of England upon the general excellence of the Classes placed before them. The improvement of this breed of horses of recent years is quite distinct. This year at Windsor the two-year-old fillies, also the yearling fillies, and, we may add, the two-year-old colts and yearling colts, formed strong and good Classes, and spoke well for the future of the Shire horse.

CLASS 42. *Stallions foaled previous to the year 1886.*—The prize horses in this Class were good and looked like making valuable sires. Altogether it was a strong Class, considering that the entire-horse season was not yet over. The RESERVE NUMBER, No. 581 (Mr. T. H. Miller's *Mohammed*), was a good type of Shire horse, but he had not got the weight of the prize horses. Other good specimens followed.

CLASS 43. *Stallions foaled in the year 1886.*—After the first and second prize horses the remainder formed a very moderate class; but, considering the foreign demand for Shire colts, and that the "Royal" this year comes within the "Season," there is some excuse for a weak class. The FIRST PRIZE horse, No. 591 (Mr. T. H. Miller's *Munchausen*), is worthy of a Royal Show prize, and ought to make a valuable sire.

CLASS 44. *Stallions foaled in the year 1887.*—A large and good Class. We found quite a number of promising colts in this Class, possessing good wearing legs and feet, and when matured they will make valuable horses at the stud.

CLASS 45. *Stallions foaled in the year 1888.*—This was also a good and strong Class. We thought the FIRST and SECOND PRIZE colts, No. 639 (the Earl of Dysart's *Witham Prince*) and No. 637 (Lord Wantage's colt by Prince William), respectively, stood out in bold relief.

CLASS 46. *Mares and Foals.*—Not a strong Class in point of numbers—nine entries, and only three present. The Show is probably too early in the year to move young foals far; however, the mares present were full of merit.

CLASS 47.—*Mares not having had a Foal in 1889, but served in 1889.*—Two grand mares stood First and Second: FIRST, No. 666 (Mr. Freeman-Mitford's *Chance*), and SECOND, No. 662 (Mr. Sutton-Nelthorpe's *Starlight*), of which their respective owners may feel proud. As a pair of mares the two would be hard to beat.

CLASS 48. *Fillies foaled in the year 1886.*—Some good fillies appeared in this Class. The FIRST PRIZE, No. 672 (Lord Belper's *Balance*), was a beautifully balanced filly and a grand level mover. She again was followed by some good coloured, strong, promising young animals.

CLASS 49. *Fillies foaled in the year 1887*.—A very good Class. We had to Highly Commend eight after the prize fillies and the Reserve Number.

CLASS 50. *Fillies foaled in the year 1888*.—Another remarkably good Class, strong both in point of numbers and of merit. The FIRST PRIZE filly, No. 736 (Mr. J. P. Cross's *Arcadia*), deserves special mention, being so strong and square, with correct legs and feet. Other good fillies followed on, ten being Highly Commended or Commended.

The winner of the GOLD MEDAL given by Her Majesty the Queen, and the CHAMPION PRIZE of 50*l.* offered by the Shire Horse Society for the best Shire Stallion, was No. 573 (Lord Wantage's *Prince William*), the FIRST PRIZE Stallion in Class 42; the RESERVE NUMBER going to No. 580 (Mr. A. C. Duncombe's *Harold*), in the same Class.

The winner of the GOLD MEDAL given by Her Majesty the Queen, and the CHAMPION PRIZE of 25*l.* offered by the Shire Horse Society for the best mare or filly, was No. 666 (Mr. Freeman-Mitford's *Chance*), in Class 47, and No. 662 (Mr. Sutton-Nelthorpe's *Starlight*) in the same Class took the RESERVE NUMBER.

These all possessed symmetry, activity, and strength, and did credit to this important breed of draught horses.

PETER BLUNDELL.
W. N. SABERTON.
HENRY SMITH.

CLYDESDALE HORSES.

In the early days of the Royal Show all the heavy horses were massed together, without reference to breed, so that the task of judging—always a thankless one—must have then been most unenviable. Imagine a man being asked to-day to judge a class containing a Shire, a Suffolk, a Clydesdale, and, possibly, a horse coming under the head of "Agricultural"—one, that is to say, which is not eligible to compete as one of the distinct breeds. Yet this is virtually what the Judges of old had to do; and the only wonder is that the *Sporting Magazine* was not now and then the medium of a wordy war in connection with disputed decisions. But they were good losers those exhibitors of nearly half a century ago, and set an excellent example to some of the show-men of to-day. The Judges did their best to discover whether a Suffolk, a Clydesdale, or an Agricultural horse should be put first—a problem impossible of solution as we generally deem it now, and the exhibitors appear to have acquiesced in the decision arrived at. The Clydesdale men, however, declined to acknowledge defeat, as, although they exhibited regularly, we scarcely find the breed mentioned till 1848, when a Clydesdale stallion succeeded in carrying off Second Prize for the newly instituted class of dray-horses; and that Clydesdale, by the way, is said to have been about the only one in the Show. Later on, however, the breed came in for recognition, as at Carlisle there appear to have been four Clydesdale classes, organised for that special occasion on account

of the propinquity to Scotland; while at Battersea, in 1862, the show of Clydesdales was so good that seven years later it was referred to in these words: "The Clydesdales (at Manchester) only made one third of those at Battersea." But between 1862 and 1869 the catalogues knew no Clydesdale class, except in 1864, when, the Show being again held in the North (Newcastle), Clydesdale classes were introduced. Plymouth, in 1865, was too far west for the Scottish breeder; Bury St. Edmunds was busy encouraging Suffolks; Manchester, however, was the turning-point, and since 1869 the Clydesdales have had classes to themselves. The breeders have not been slow to prove that they appreciated the distinction, for the class has gone on improving; and the most captious critic would hesitate before he asserted that the Clydesdales at Windsor, taken as a whole, were not worthy of the occasion.

As in the case of most other breeds of horses, the origin of the Clydesdale is a matter of some uncertainty. In the distant past he certainly was not the massive and majestic animal we now look upon; the modern Clydesdale is a manufactured article of comparatively recent date. In his recent work, *The North Countree*, to which allusion has already been made, Mr. W. Scarth Dixon promulgates the theory that the Cleveland bay is descended from the admixture of Eastern blood, during the time of the Roman occupation of Britain, with the native mares; and the author further states that a legion of the Crespinian horse was stationed at Danum, the modern Doncaster, the members of which were mounted on horses obtained from Carthage. The Devonshire packhorse—those sturdy useful horses which performed the duties of carriers' carts over the rugged roads and across the moors, and in whose interest some of the queer little bridges found in the "west countree" were built—bore a very strong resemblance to the Cleveland bay, except that his legs were white instead of black; but this was also a peculiarity of the now extinct Northumberland chapman horse.

"Stonehenge," in his book on *The Horse*, says that the Clydesdale is supposed to have sprung from the Flemish horse, crossed with the descendants of the packhorses, which were retained in use longer in the north than in the south. Consequently there may be some ground for thinking that the ancestors of the Clydesdale were of the packhorse stamp. Safe, free action was another characteristic feature of the packhorse, as it also was of the early Clydesdale, who has furthermore been described by an authority as a smallish horse, with capital legs and feet, and not the best of shoulders, which were rather low.

Of such a type seems to have been the aboriginal Clydesdale; but his present majestic proportions are due to judicious crossing.

One undoubted stimulus towards the improvement of the Clydesdale may be traced to the fact that Scotchmen were better agriculturists than were the Southerners, and, in the use of the iron plough, were in advance of the English. Any one who has ever seen a picture of the old twelve-oxen plough, with which the English soil was turned in the eighteenth century, will readily understand what advantages the Scotch implement had over the former. It is, nevertheless, a curious fact that Mr. Barclay, of Ury, who succeeded to the family estates in 1760, gained his agricultural experience in Norfolk, and is said to have imported a Norfolk ploughman to teach the natives how to plough, while employing, as Mr. Robertson says, "only the people of the country that were bred on his own lands or in the vicinity; his discipline was very severe, but it was very correct." His one desire, on settling down, was to have his land cultivated in first-rate style; and the story runs that, on finding one of his ploughmen declining to follow out his directions, he addressed him thus—Mr. Barclay had previously joined the Society of Friends—"Friend, thou knowest that I feed and pay thee to do my work in a proper manner; but thou art wise in thine own eyes, and regardest not the admonitions of thy employer. I have hitherto spoken to thee in a style thou understandest not; for verily thou art of a perverse spirit. I wish to correct thy errors for my own sake and for thine, and therefore *thus* tell thee," and the irate squire felled the son of the soil with a blow which would have staggered an ox. "Though," says the story-teller, "the weapon was carnal, this was the demonstration of power, and had the desired effect; the ploughman became tractable and quiet as a lamb." It was probably after this episode that Mr. Barclay—who came of an athletic family, and was an ancestor of the Captain Barclay who walked 1,000 miles in 1,000 hours—sought the assistance of the Norfolk ploughman. At any rate, it was obvious that good horses were necessary in order that a plough should show to the best advantage; the need for quick-walking cattle may have acted as an inducement to set about reforming the Clydesdale, which designation, by the way, is a modern one.

All authorities are agreed that the increase in size in the Clydesdale is due to a cross with Flanders horses; and, in his valuable compilation the retrospective volume of the Clydesdale Stud-book, the Earl of Dunmore, to whom the thanks of

Clydesdale breeders are due, mentions the legend that a former Duke of Hamilton imported, towards the end of the seventeenth century, half a dozen black Flemish stallions, with which the native mares were crossed. But he further cites the writings of Mr. William Aiton, of Strathavon, who appears to discredit the story, which is probably as mythical as that which tells us two Eastern horses reached England in 1121, and that, while one is said to have remained in England, the destination of the other is vaguely said to have been "St. Andrew's Church, Scotland," to which it was sent as a present by King Alexander I. The balance of opinion goes to suggest that the infusion of Flemish blood into the Clydesdale strain did not take place till about 1715 (though it is curious to note it assisted in renovating the Great Horse, as King John imported 100 Flemish stallions), when Mr. Paterson, of Lochlyoch, journeyed to the south, and bought a Flemish stallion, with which his mares were mated. The result of this cross soon made his stud famous, not in Scotland only, but in England, and it is to the Lochlyoch stud that the first improvement in Clydesdales is attributed. The Rev. David Ure, of Rutherglen, does not, however, discredit the story of the Duke's six Flemish coach-horses; but, as Mr. W. Aiton lived on the very place to which they are said to have been taken, tradition would surely have kept their memory green.

The 6th Duke of Hamilton, who succeeded to the title in 1742, and died in 1758, imported one Flemish stallion, which, strangely enough, he christened Clyde, and which, following so closely on the introduction of Flemish blood by Mr. Paterson, went far to give a distinctive character to the horses bred in Lanarkshire and the adjacent counties. There is, however, a somewhat important difference between the version of Lord Dunmore and that of "Ben Alder," who wrote on Clydesdales in the *Newcastle Chronicle* in 1887; for whereas the Clydesdale Stud-book says that the Duke of Hamilton's six Flemish horses were introduced about 1650, "Ben Alder" makes the story refer to the 6th Duke, who lived nearly 100 years later. Some entries in Mr. Lawrence Drew's private stud-book prove the importation of the Flanders horse by the 6th Duke of Hamilton. In that compilation "Clyde" is described as a black-brown horse; and Mr. Drew had talked with a man who knew the groom well when he travelled with the horse.

This foundation having been laid, the Highland Society offered, in 1823, a prize for the best Clydesdale or other mare well qualified for working the strong lands. The mare thus selected was to be brought into or retained in the county of

Perth, and to be the *bonâ fide* property of any landlord or tenant in the county, "and to be kept for the purpose of breeding." Four years later all restrictions appear to have been swept away, and the Highland Society's prize was open to everybody. The next step in the building-up of the Clydesdale seems to have been recourse to English blood, as one breeder after another came down south in search of a suitable cross; and this departure, like that of the introduction of Flemish blood, was so eminently successful, that some of the best-known horses of to-day may, through the medium of the Clydesdale Stud-book, be traced to have kinship with English horses.

A glance at this year's catalogue showed that among the large number of owners who had entered their horses at Windsor were all the foremost breeders. Had the Royal taken place at the usual time, the stallion classes might possibly have been better filled, for June comes in the midst of the season for sires; but, on the whole, there was not the slightest reason to be dissatisfied with the entries, which numbered nearly 100. For the reason just stated, the class for Aged Stallions was made up of three out of the five entered; but it was a pity that one of the absentees was Mr. Montgomery's well-known horse "Sirdar," as his presence might have added keenness to the competition. Still, an excellent trio were left to fight out the issue. Mr. David Riddell's name is so intimately associated with the advance of the Clydesdale that no one grudged him his victory with "Grand National," an improving horse who was placed third at the Spring Show, though in the estimation of the Judges there was probably very little between him and the Duke of Portland's "Macaulay" (first in his class at Newcastle), who was placed second; the latter has possibly the better action of the two, but yields to the winner in outline and substance. The third horse, Mr. J. S. Hodgson's "Sir Hildebrand," claimed honours at Norwich three years ago, and is an instance of the Clydesdale being indebted to English blood, as his dam "Darling," who won many prizes, was by "Tintack," an English-bred horse; and one of "Darling's" grandsons, "Lord Salisbury," was sold a few years ago for 1,500*l*. In the Three-year-old Class Mr. John Gilmour's "Prince of Albion" had virtually a walk over, in spite of the good company in which he moved. The adage, "Like father, like son," was here verified to the letter, "Prince of Albion" being by that very famous sire "Prince of Wales," possibly the finest horse that ever passed through Mr. Riddell's hands. Among his many victories was the First Prize at Manchester in 1869, when, as already stated, Clydesdales first competed in classes confined to themselves; and

"Prince of Albion" is another example of the immense service English blood has been to Clydesdale breeders, for both his grand-dams were English, and, curiously enough, both were grey. At a later stage his excellence was duly rewarded by the bestowal upon him of the Queen's Gold Medal and the 25*l.* given by the Clydesdale Horse Society.

The two-year-olds were numerically strong, fourteen out of the seventeen entered coming into the ring. It was in the fitness of things that some of the Queen's exhibits should win at Windsor, and one of them did so here. But it was a very near thing, and only turned upon the casting vote of one of the Shire horse Judges who was called in to decide. It so chanced that the Queen's horse, "First Choice," and Mr. Crawford's "Prince Robert" by "Prince of Wales," were of quite different types, and while one Judge fancied one, his colleague inclined to the other. As each had knowledge and experience of his own, and moreover the courage of his opinions, neither would budge from the position he had taken up, so Mr. Peter Blundell was fetched from an adjoining ring, and he agreed with the Judge who was in favour of placing "First Choice" before "Prince Robert." It was purely a question of opinion, and either horse might have been placed first without the soundness of the decision being challenged. "First Choice" was formerly the property of Mr. Montgomery, and was scarcely in show condition, but stands on good limbs, and is perhaps a better bodied horse than his rival, whose action was possibly his strongest point. Mr. Kerr's "Master Jack" was a good third.

The judging of the Yearling Class resulted in still more laurels for the sire "Prince of Wales," whose son, "The Magician," the property of Mr. G. Rodger, was placed first. It was a close contest between him and Mr. Crawford's "Laurence Again," but the latter was put second, and though there were some nice youngsters in the Class, the remainder were a little deficient in substance.

When Lords A. and L. Cecil held their recent sale they bought in some of the lots, among them being the famous "Edith Plantagenet" and "Cornflower." The former made a very good bid for first place, and her action was greatly admired; but she was ultimately beaten by Mr. Balfour's "Miss Alice." The six mares which have not had a foal this year were a good Class, and the task of the Judges in placing the first two was by no means an enviable one. Mr. Paterson's "Laura Lee," who was thought worthy of a portrait in the last volume of the Stud-book, won at the Royal at Newcastle in 1887, and has improved considerably since her three-year-old days, being now

a very fine specimen of a draught mare. Mr. Hood's "Ethel," "Laura Lee's" most dangerous opponent, has perhaps a slight advantage in the matter of feet and legs, but ultimately "Laura Lee" was placed first. This decision was generally approved of, as last year "Laura Lee" was regarded as the best Clydesdale mare shown. At the Dumfries Show, a twelvemonth ago, she was beaten by "Ethel," who also gained the Champion Cup, but upon whom the tables were now turned. There were only half a dozen three-year-old fillies entered; but quality made up for any deficiency in quantity, and a better filly than Mr. Riddell's "Sunrise" it would be almost impossible to see. Her merits have been recognised at many other Shows, and at Windsor the Judges gave her the highest honours they had to bestow, as, in addition to being first in her Class, she gained the Queen's Medal and the Championship Prize of 25*l.*, the gift of the Clydesdale Society. Mr. Gilmour's "Primrose," own sister to "Laura Lee," and, like her relative, a winner at Newcastle, was second. Thus "Darnley's" reputation as a sire was enhanced, the winning barren mare, and the first and second in the Three-year-old Class, being by him.

Thirteen out of sixteen two-year-old fillies came out, and there was very little to choose between the first three, while had the Judges reversed the order of the first two, no one could have said that they committed an error. Mr. Dunn's "Lady Laurence" and Mr. Walker's "Sweetbriar" are old opponents—for their years—and victory has rested sometimes with one and sometimes with the other. On the present occasion it was "Lady Laurence" who was put first. Lord Polwarth's "Luxury" was the third of as promising a trio of fillies as one would wish to see. The yearling fillies were a little behind the others in appearance, though a good word must be said in favour of the First Prize winner, Mr. Scott's "Scottish Snow-drop," another of "Prince of Wales's" set. Mr. Scott, who won in the Yearling Class last year with "Scottish Rose," has now been successful for two years running.

Report of the Judges of Clydesdale Horses.

[Classes 51 to 59.]

CLASS 51. *Stallions foaled previous to 1886.*—There were five entries in this Class, of which three appeared before the Judges. The FIRST and SECOND PRIZE horses, No. 743 (Mr. D. Riddell's *Grand National*), and No. 742 (the Duke of Portland's *Macaulay*), were very good specimens of the breed, and were nearly equal in merit.

CLASS 52. *Stallions foaled in 1886.*—There were eight entries in this Class, of which four were forward. This was, on the whole, a fairly good Class. It contained, in No. 751 (Mr. John Gilmour's *Prince of Albion*), one

of the best Clydesdale stallions which has been seen for many years, his quality and action leaving nothing to be desired. He was awarded not only the FIRST PRIZE in his Class, but also the Queen's GOLD MEDAL for the best stallion exhibited in Classes 51, 52, 53, and 54, and the CHAMPION PRIZE of £25 offered by the Clydesdale Horse Society for the best Clydesdale stallion exhibited.

CLASS 53. *Stallions foaled in 1887.*—In this Class there were seventeen entries, and fourteen exhibited. There were a number of very good horses, notably No. 753 (*First Choice*, belonging to Her Majesty the Queen), and No. 768 (Mr. Peter Crawford's *Prince Robert*). These two horses, although of different types, are excellent specimens of the breed, and will, in all probability, grow into very valuable sires.

CLASS 54. *Stallions foaled in 1888.*—There were ten entries in this Class, nine of which were forward. This was a fair Class on the whole, several of the lot giving promise of becoming horses of good quality and substance.

CLASS 55. *Mares and Foals.*—There were seven entries here, of which six were exhibited. The mares which were awarded the prizes were very good, and have previously distinguished themselves in the Show-yard.

CLASS 56. *Mares not having had foals in 1889, but served in 1889.*—There were seven entries here, of which six were forward. Taking this Class as a whole, it was the best of all the Clydesdales. The mares which were awarded prizes were excellent in symmetry and action; indeed, it is seldom that four such good specimens appear together.

CLASS 57. *Fillies foaled in 1886.*—There were six entries in this Class, and five of these appeared before the Judges. It contained the best female Clydesdale in the yard, No. 800 (Mr. D. Riddell's *Sunrise*), which was awarded FIRST PRIZE in her class, the Queen's GOLD MEDAL, and the Clydesdale Horse Society's prize of £25 for the best Clydesdale mare or filly. The other prize winners were very good.

CLASS 58. *Fillies foaled in 1887.*—There were sixteen entries in this Class, thirteen of which faced the Judges. The Class, as a whole, was a very strong one, the prize winners notably standing out as animals of exceptional promise.

CLASS 59. *Fillies foaled in 1888.*—The yearling fillies numbered eleven. They were a very creditable lot, but the First and Second Prize winners stood well out from the rest. These two fillies were so equally matched that the Judges experienced some difficulty in placing them.

ANDREW RALSTON.

WILLIAM TAYLOR.

SUFFOLK HORSES.

To an extent not known in connection with other breeds of heavy horses, the Suffolks have retained their distinguishing characteristics. Shires, Cleveland, and Clydesdales, as we see them now, are admittedly the produce of frequent crossings, and owe their conformation, size, and distinguishing marks to the infusion of some particular strain of blood. When, however, we come to examine the history of the Suffolk, we are unable to discover that he ever resembled any other horse. He certainly was not always what he is now; but there was always a difference between him and other breeds, and the veriest novice who ever entered a show-yard could never mistake a Suffolk for a

Shire or Clydesdale. It is worthy of notice, too, that so far as it is possible to trace the history of the Suffolks, we do not find that their present conformation is due to any crossing of external blood with the stock indigenous to the soil, so to speak. It is also a curious fact that, while Shires and Clydesdales vary in colour, Suffolks are, and always have been, some shade of chestnut.

When Arthur Young, himself a Suffolk man, perambulated England and wrote his impressions, he did not hesitate to describe the Suffolk as one of the ugliest horses to be found in the country; he was big and plain about the head; low in the shoulder, small in the eye, and in other particulars did not correspond to the ideal of beauty. In Mr. Young's day the Suffolk was a small horse, and from various accounts appears to have been available for farm, saddle, and harness work; while he was also pressed into the service of carriage people before roads were as good as they are now.

Suffolk fox-hunters who now find themselves compelled to ride over plough from the beginning of the season to the end may perhaps envy their ancestors who rode to hounds when Suffolk was a cheese- and butter-making county; yet much of it was so at the period when Camden penned his *Britannia*. In that publication, which was given to the world in 1586, occurs the first mention of the Suffolk horse. He might have existed, and probably did exist, for a long time prior to that date. Successful attempts have, however, been made to add to the stature of the Suffolk horse; and, as some critics affirm, at the expense of his legs, for they say that bone has not increased *pari passu* with the weight of his carcase. But this point must be settled by the Suffolk breeders themselves, who may, however, fearlessly assert that, if a shapely horse has been evolved out of unshapely ancestors, the dogged perseverance of the Suffolk has not been bred out of him. The more massive specimens are every whit as staunch at the collar as their more diminutive predecessors, though curiously enough some persons incline to the idea that the Suffolk horse has now less substance than he had forty years ago.

In connection with the Royal Show the Suffolk horse may boast of a somewhat remarkable history, as it was a Suffolk horse, owned by Mr. Thomas Freeman, of Henham, near Wangford, that won the First Prize for heavy horses at the first Show in 1839, having travelled to Oxford to win his premium of 20*l*. In those days, it must be remembered, the various breeds were not separated, so Mr. Freeman's victory was of the nature of a championship, involving the vanquishing of the other

kinds. At Liverpool in 1841, and at many other Shows, the East-Country breeders were successful—so much so, in fact, that in twenty-three years twenty-three prizes fell to the Suffolk horses. This at one time, and perhaps not unnaturally, appears to have caused some little jealousy on the part of breeders of other horses, and it was stated among other causes that the Suffolks owed their good fortune to the circumstance that the men who judged the heavy horses were almost invariably Suffolk men; that Suffolk had a preponderating number of men on the Society's Council, and so forth. All these and similar statements are carefully reviewed in the introduction to the first volume of the Suffolk Stud-book, and are shown to be without foundation.

A far more probable theory is that at a time before Clydesdales and what are now termed Shires had reached their present high standard of excellence, the Suffolks were as good as they are now; they had their own individuality, had not been crossed with other strains, and fairly won on their merits, just as, comparatively lately, Mr. Wolton's horse "Emperor," who was first in his Class at Windsor, gained the prize in a Class in which other breeds competed. The Suffolks pretty well cleared the board at Lewes in 1852, and the breeders were apparently so elated at their success that they mustered strongly the next year at Gloucester, where, with the exception of the Suffolks, the show of horses was miserably poor. At Chelmsford, in 1856, the Suffolks won nearly everything; and in 1862, at Leeds, the Suffolks had classes to themselves, and eighteen aged stallions and thirteen younger ones were entered. So that this breed, besides winning the first prize ever offered by the Society, was the first to be separated from the others, who competed together for some time afterwards.

To come to the more immediate object of these remarks, the show of Suffolks at Windsor was exceedingly good; though in their case, as in that of Cleveland and Clydesdales, one must visit the native shows to see the breed at its best. Still, at Windsor the Suffolk men did themselves full justice with 105 entries; and perhaps on no previous occasion, except in 1886 when the Royal was held at Norwich, has there been a better show. The aged stallions were a very good Class, and included Mr. Wolton's "Emperor," bred by the exhibitor. He is a magnificent dark chestnut horse on short legs, with great girth and a capital back and loins, and he had not much difficulty in beating Mr. Byford's "Iron Founder." Mr. Smith's "Wedge-wood," who, like "Emperor," comes from that horse-breeding centre Woodbridge, was first in the Three-year-old Class, and, with his capital loins and short canon bone, was a very taking

horse indeed. As the Two-year-old Class was a very strong one, it shows the strength of Mr. Wolton's stable that Mr. Wolton was able to win with one of his own breeding, "Pride's Pilgrim," a wonderfully short-backed and short-legged colt, and well topped. Very little inferior to him was Messrs. Pratt & Son's well-grown colt "Crawley Cup Bearer," while "The Don" of Mr. Catchpole—an old Suffolk name—was a fair third; but would have been better still had he not been a trifle back on the knees.

These four winners in due time appeared to compete for Championship honours, and an interesting tussle ensued. "Emperor" had a large following, and as he is but a four-year-old he was not put out of court, on the plea that he might now give way to a younger competitor. The real contest lay between "Emperor" and the three-year-old "Wedgewood," and after much deliberation the Judges decided in favour of "Wedgewood," who thus took the Queen's Gold Medal, and 25*l.* given by the Suffolk Stud-book Association, a distinction which gives him a high place among the horses of the year, the more so as he had never been beaten at any Show at which he had previously appeared. The yearlings were another strong Class, and the winner, Mr. Wrinch's "Nottingham," a white-ticked colt, had many good points in his favour, though he is too low on the shoulder, and is a somewhat plain youngster. In fact, in point of make and shape he seemed inferior to Mr. Pettit's "Windsor Captain," a powerful colt on good legs, and having a strong back and loins.

The brood mares and foals were good, and fairly numerous; and the Judges preferred Mr. Manfred Biddell's "Miller" to Mr. Wrinch's "Juno," though a good many of the ring-side critics would have put them in reverse order. The barren mares were even better still; and in this class it was that the winner of the Queen's Medal and the bonus given by the Suffolk Stud-book Association was found, viz. Mr. Byford's mare "Bounce." Mr. Byford followed up his luck by winning in the Three-year-old Filly Class with "Mettle"; Mr. Smith's "Dora" was Second, and Mr. Manfred Biddell's "Maybud" Third; while in the Two-year-old and Yearling Classes the chief honours fell to the lot of those owners who had already been successful in previous Classes—that is to say, Mr. Biddell and Mr. Wolton were the winners with "Snap" and "Chieftain's Queen" respectively. Mr. Wolton's record as exhibitor and breeder is sufficiently remarkable to be made the subject of special notice. He won First Prize in the Aged Class for Stallions; First in the Two-year-old Class; and First in the Class for Yearling Fillies.

He was Second in the Barren Mare Division; Reserved and Highly Commended, as well as Commended, in the Two-year-old Stallion Class. As a breeder he stands out as having bred all his own decorated horses except "Drummer," who was Commended in the Two-year-old Stallion Class; the Duke of Hamilton's "Pride's Diadem," Second in the Three-year-old Stallion Class, and possibly possessed of as much bone as any Suffolk in the Show; and Mr. Smith's "Queen's Diadem," placed Third in the same Class.

Report of the Judges of Suffolk Horses.

[Classes 60 to 68.]

The Suffolk Horses were strongly represented both in numbers and quality, especially the younger ones. There has been a great demand for this breed of horses during the last two or three years for exportation, and the best of the older animals have been sold to go abroad. The two and three-year-old stallions, and also the fillies of the same ages, were the best collection of the breed that we have ever seen at a Royal Show.

CLASS 60. *Stallions foaled before 1886*.—A poor Class. The FIRST PRIZE horse, No. 832 (Mr. H. Wolton's *Emperor*), is a very good horse, and was RESERVE NUMBER for the Queen's GOLD MEDAL.

CLASS 61. *Three-year-old Stallions*.—A good Class, which furnished the GOLD MEDAL winner, No. 841 (Mr. A. J. Smith's *Wedgewood*), a very compact, clever animal, with remarkably good feet and legs. The SECOND PRIZE went to No. 847 (the Duke of Hamilton's *Pride's Diadem*), a very big horse, rather high, but with great bone, and looks like making a good horse. There were several good animals in this Class, to which we awarded Commendations beyond the prizes offered.

CLASS 62. *Two-year-old Stallions*.—A very strong, good Class. There were several absentees, but seventeen came before us, and in addition to the three prizes given, we considered six more to be worthy of special notice.

CLASS 63. *Yearling Stallions*.—Only seven out of twelve entries were shown. There were some good animals amongst them, especially the FIRST PRIZE colt, No. 876 (Mr. R. H. Wrinch's *Nottingham*).

CLASS 64. *Mares and Foals*.—A good lot, though short in number. The RESERVE for the GOLD MEDAL, No. 892 (Mr. M. Biddell's *Miller*), was amongst them.

CLASS 65. *Mares, not having had Foals in 1889, but served in 1889*.—Also short in number, but this Class furnished the CHAMPION mare, No. 897 (Mr. W. Byford's *Bounce*), which is a remarkably smart, handsome mare, four years old.

CLASS 66. *Three-year-old Fillies*.—Twelve good animals shown. We Commended the whole Class.

CLASS 67. *Two-year-old Fillies*.—A large entry, but there were several absent. The animals shown were all of considerable excellence, and we Commended the whole of them.

CLASS 68. *Yearling Fillies*.—A weak Class. The First Prize went to a good one.

JOHN A. HEMPSON.
D. A. GREEN.

DRAUGHT HORSES.

Of these not very much can be said: and the poorness of the entries must have surprised even the least sanguine of the Council. There is surely no lack of dray horses exceeding 16 hands 2 inches in height, and not qualified to compete as Shires, Clydesdales, or Suffolks; but where were they? There were only four entries in the Dray Class, and eight only in the Agricultural Class. There was not a single entry for pairs of dray horses, and Lord Wantage was the sole owner represented in the Class for Agricultural Pairs, a very poor show for prizes, worth in the aggregate 120*l*. One would have thought that these would be popular Classes. At the cart-horse parade held on Whitsun Monday, a number of valuable and massive animals, but not eligible for either of the Stud-books, were seen, and as Windsor is not far from town, the writer, for one, thought that this division would have been worth looking at.

Report of the Judges of Draught Horses.

[Classes 69 to 72.]

A moderate lot of animals, and we recommend the Society to discontinue these prizes if better entries are not forthcoming.

ANDREW RALSTON.
JAS. MARTIN.

ASSES.

Seventeen donkeys, as the general public would persist in calling what the catalogue designated Asses, were entered in the two Classes devoted to these animals. As the majority of Englishmen see no prouder specimens than those in costermongers' barrows and at the seaside, it goes without saying that we are poor judges of Egyptians, Poitous, Poitou-Spanish, Assyrians, and others which were shown in the Stallion Class. Mr. Charles Sutherland, well known as an accomplished four-horse coachman, also devotes much time and trouble to the breeding of asses; and his two, "Malta Jack," a black Maltese, and "Cetewayo," a black Poitou Maltese, were first and second. They were far and away the best in the Class; but as a matter of fact the money value of the second was very many times that of the first. In the Class for She Asses, with or without foal, Mr. G. Hanbury was first with "Zenobia," a fine lengthy specimen of the Spanish variety.

Report of the Judges of Asses.

[Classes 73 and 74.]

Seventeen asses were entered for competition, eight Jacks and nine She-asses. They were of all sorts and sizes, and included specimens from Spain,

France, Cyprus, Malta, Syria, and Egypt, besides one or two natives of England. As their several characteristic points were so different, we considered their merits entirely with a view to their value for breeding purposes.

P. FEILDING, Lt.-Genl.

THOS. A. SPENCER.

In bringing a somewhat lengthy story to a close, it may not be out of place to notice shortly the present pecuniary inducement to breed good horses of all kinds. At the termination of the Shire Horse Show in February last, 173 lots were put up to auction and realised a total of just 14,300*l.*, or something like 82*l.* per head, and this list contained scarcely any prize-takers. Some of the more famous horses were disposed of by private contract, and 1,000 guineas and upwards are said to have been given for several. But the foreign trade has advanced with the proverbial leaps and bounds; and the number of horses exported during the nine months of the present year ending on the last day of September was no fewer than 10,642. If the United States buyers have purchased less freely than they did last year the prices would appear to be better; and it is the opinion of the chief shippers of agricultural horses that the demand will not fall off. The shipment of Shires, Clydesdales, and Suffolks is certainly on a large scale, and it will be interesting to watch whether, in days to come, foreign buyers will be as successful in getting hold of our best mares as they were at an earlier period in the history of horse-breeding. In this respect, however, the breeders of heavy horses will doubtless profit by the experience of those who went in for the breeding of hunters; while the breeders of the latter stamp can learn a useful lesson from the breeders of those types which have stud-books. In the case of these, sires and dams are of one stamp, the produce resembles the parents, and, being good raw material, sells for a remunerative price when one or two years old; whereas the hunter breeder is often heard to complain that he can get nothing for his young stock, for the reason, as it seems to the writer, that, the mares being too often old, worn out, and undersized, the progeny is frequently worthless in the eyes of men who want something good enough to show, or likely to develop into a weight-carrier.

While admitting that the rank and file of hunter breeders—that is to say, some of the small farmers—are far less particular than they should be about their mares, one cannot altogether assent to the assertion of the Italian Government that a decadence has taken place in the breeding of half-bred horses in England. This lament is uttered in the pages of the *Annali di*

Agricoltura, the Italian official organ, of which a translation has been published by the Board of Agriculture. This assertion appears to be based on the fact that the owner of a hackney stallion who refused to take "one penny less" than 1,000*l.* for him in 1887, accepted 400*l.* in the following year; while the owner of another took 500*l.* after declaring that he would not sell at any price. The Italian Commissioners, however, were less successful when they came to buy thoroughbred sires, and, after setting their hearts upon "Huguenot" and "Khamseen," they were obliged to return without those horses, as the prices, 700*l.* and 1,000*l.* respectively, were in excess of what they were authorised to expend. The young hunting stock at Windsor showed what judgment and liberality could effect; while in the heavy Classes the show was most satisfactory; and the lover of horses has probably never seen a better collection of all breeds.

XXX.—*Report on the Cattle Exhibited at the Windsor Show,*
1889. By WILLIAM HOUSMAN.

IN the following report upon the cattle exhibited in Windsor Great Park, on the occasion of the fiftieth anniversary of the Royal Agricultural Society of England, the reader will observe a departure from the customary plan of reporting for the Society's Journal. Before the usual descriptive notice of the Classes of each breed, a few historical facts relative to the breed and its first recognition in the Prize Lists of the Society are introduced, as likely to be useful for future reference.

From the beginning the Shorthorn, Hereford, and Devon breeds have been recognised as "national," and have never failed to appear, in the same order as here observed, at any one of the forty-nine Shows to which cattle were admitted. All other breeds were at first regarded as "local," and invited to compete in separate Classes only at those Shows which touched or nearly approached their homes; but there were still open to them at the farther distant Shows the Classes for "any other breed," and the old Longhorn, the Sussex, the Black Polled, the Red Polled, the Channel Islands, and other distinct breeds of cattle, at Shows where no classes were allotted to any of them exclusively, have often made a very creditable, if miscellaneous, appearance.

One of the most remarkable instances of the rapid extension of a breed of cattle, long known before its general acceptance, is found in the rise of the Jersey breed, as illustrated by the

Society's Prize Lists. This will be considered under its proper heading in the course of the following report.

Some of the breeds, which in their native countries have not yet taken much more than a local position, have gained importance through the recognition of their merits by the colonist and the foreigner. It is obviously within the scope of the Society's traditions, and in accordance with the Society's usage, to afford every possible encouragement to the owners of such breeds to develop their usefulness to the utmost, so as to foster international trade, to the benefit of the English producer. There is a double benefit to the breeder from the recognition of his stock as a breed deserving special Classes—in the first place, the spur or stimulant to progress which competition in those classes supplies, and secondly, the value of exhibition in such classes as an advertisement to the world, by reason of the presence of foreign and colonial visitors at the Annual Shows.

A list of the places successively visited by the Society will be found serviceable to the reader for ready reference, as showing where and when the exhibitions have been held in the districts of the different breeds. The names of the cities and towns are given therefore in the following list in the same order in which the Shows took place, and every tenth Show has the date added:—

Oxford (1839), Cambridge, Liverpool, Bristol, Derby, Southampton, Shrewsbury, Newcastle-upon-Tyne, Northampton, York, Norwich (1849), Exeter, Windsor, Lewes, Gloucester, Lincoln, Carlisle, Chelmsford, Salisbury, Chester, Warwick (1859), Canterbury, Leeds, Battersea (International), Worcester, Newcastle-upon-Tyne, Plymouth (in the summer of this year, 1865, the outbreak of Russian cattle-plague or rinderpest occurred, so that no Show was held in 1866, and the Show of 1867 was held, without Cattle Classes, at Bury St. Edmunds), Leicester, Manchester (1869), Oxford, Wolverhampton, Cardiff, Hull, Bedford, Taunton, Birmingham, Liverpool, Bristol, Kilburn (International, 1879), Carlisle, Derby, Reading, York, Shrewsbury, Preston, Norwich, Newcastle-upon-Tyne, Nottingham, Windsor (1889).

SHORTHORN CATTLE.

The history of the Shorthorn may be illustrated by the rise and progress of a river. On some windy fell, or high bleak moorland, or in the recesses of a mountain range, we may notice a single water-spring, or possibly a few swampy neighbouring spots from which the water trickles into a common pool, whose overflow, first a shallow brooklet, gathering volume from

various tributaries, becomes a rivulet, and eventually swells into the dignity of a river. This will apply to other breeds, but as the simile suits the Shorthorn case it may be fitly appropriated here. Far back in the last century we trace the bubbling-up from obscure sources. It is really groping work when we try to explore beyond "Old Tripes," the cow which scholars naturally imagine hobbling on three feet, although unlearned interpreters, saving a syllable in the pronunciation, associate her name with onions. In like manner the Shorthorn bull "Boötes" was popularly known as "Boots."

The first volume of the *Shorthorn Herd-book*, edited by Mr. George Coates with funds supplied by Mr. Whitaker, was printed at Otley, Yorkshire, in the year 1822. Mr. Coates was assisted by his son, who after his death continued the work to the fifth volume inclusive, when Mr. Henry Strafford became the proprietor and editor. The sixth volume, issued in 1846, and the succeeding volumes to the twentieth inclusive, which comprises births down to the end of the year 1872, were Mr. Strafford's. The Shorthorn Society of Great Britain and Ireland, associated for the purposes of maintaining the purity and promoting the breeding of Shorthorn cattle, then purchased the property from Mr. Strafford, and have issued the volumes annually. The thirty-fifth volume, published September 1889, including the births of 1888, brings up the number of recorded bulls to 58,369. The cows and heifers have no reference numbers.

The Shorthorn was a long-established breed when the first prize-schedule of the Royal Agricultural Society of England was issued, and had, of course, separate Classes from the first. At Oxford in 1839 its representatives were certainly animals of great merit. Some Judges have thought them the best ever seen in any show-yard. On this question, however, opinions differed in 1839, and have differed even more widely since that year. The Oxford Show was remarkable, so far as the Shorthorn classes were concerned, for the cattle exhibited by Mr. Bates, whose celebrated bull "Duke of Northumberland," two females of the same family, and "Oxford Premium Cow," who left the "Oxford" name to her half-sister's lineal descendants, were the leading winners. At Cambridge, in 1840, the Kirklevington blood was again to the front, and the "Cambridge Rose" tribe derived its name from Mr. Bates's winning heifer, descended from the "Red Roses" of Mr. Robert Colling.

At Liverpool, in 1841, Mr. Bates had a powerful rival in the field, and the chief honours in the Full-aged Classes were divided between himself and Mr. John Booth, of Killerby, whose cattle held a leading position in several years, until his brother, Mr.

Richard Booth, became an exhibitor at the Royal Shows, and over the space of nearly twenty years gained repeatedly the principal honours, besides supplying to other breeders the blood which often carried off the prizes. Mr. Bates died in 1849, and his herd, dispersed by public sale in 1850, has largely contributed to the composition of many herds successfully represented in the Royal Show-yards, whilst occasionally lineal representatives of his cattle have taken the honours. The late Earl Ducie was the principal immediate follower of Mr. Bates. The herd of Mr. Richard Booth, amalgamated with the best blood in his brother's herd at Killerby, through the use of the bull "Buckingham," passed, after his death in 1864, into the hands of his nephew, the late Mr. T. C. Booth, who exhibited with signal success at Leicester in 1868 and Manchester in 1869, afterwards resting upon the reputation won by the Warlabby herd and declining further exhibition. His later policy has been continued by his executors since his widely-lamented death in 1878, yet the influence of that herd is still evident, year after year, in the Shorthorn Classes at the Royal Shows. Reference to another member of the Booth family must not be here omitted. One of Mr. T. C. Booth's brothers (of whom, also, it is sad to write "the late"), Mr. J. B. Booth, of Killerby, using his uncle's and afterwards his brother's bulls at Warlabby, bred up a herd from which, directly and indirectly, proceeded a host of Royal prize-winners, but the last Killerby herd, unlike that of Warlabby, was dispersed after its owner's death.

It is impossible in a report of this kind to mention by name all or any considerable number of the Shorthorn breeders whose cattle, exhibited by themselves or by other owners, have taken leading places among the winners during the past half-century. A few may be mentioned as representative men. The names of Messrs. Wetherell, Wiley, Lax, Parkinson, B. Wilson, Mason Hopper, W. Smith, and T. Chrisp are associated with the breeding of high-class Shorthorns in the old-fashioned way, each depending upon his own really sound judgment rather than upon the verdict of the world in general in favour of any one strain of blood. The Raine family of Gainford had a prize-winning herd tracing back to the dawn of Shorthorn history. Sir Charles Tempest may be said to have founded a distinct strain. The late Earl of Feversham, recognising the high merits of the Kirklevington type, took it as his pattern, and used largely, but not exclusively, the Kirklevington blood.

At the Leeds Meeting, Colonel Gunter, who after the death of Earl Ducie was the principal owner of Mr. Bates's "Duchesses" in England, won the first prize for "Duchess 77th," bred exclu-

sively from the Kirklevington strain, and his beautiful twin heifers of the same tribe exemplified at the same Show the harmonious blending of that blood with that of Earl Spencer's herd, derived from the stock of Mr. Mason, of Chilton, which was dispersed in the year 1829. Mr. J. Wood, of Stanwick, bearing a name which is historical in connection with the rise and progress of the Shorthorn breed, added the Booth element to his old foundations, and sent out some good winners. The name of Mr. Whitaker is more in the back-ground as regards the Royal Shows, but his herd was the source of much winning blood, and his contribution to the success of the Shorthorn was far greater than is generally understood. The late Mr. F. H. Fawkes, breeding primarily for useful properties, bred many winners. Lady Pigot for many years bought, bred, and trained Shorthorns for the Shows, and gained a large number of prizes.

The Marquis of Exeter in bygone days, and the present Marquis, have contributed handsomely to the lists of winners. Among the names most frequently appearing in the prize-list are those of the late Mr. H. Ambler, in former years, and Messrs. Hosken and Son, now representing the very enterprising live-stock breeders of Cornwall.¹

Of late years Mr. C. W. Brierley and Messrs. W. and J. Handley, as exhibitors, have done their respective parts thoroughly, and with great success; and as representatives of Yorkshire breeders who systematically have done great things at the Shows, Messrs. W. Linton, J. Outhwaite, T. Willis and T. H. Hutchinson may be fairly selected. Mr. B. St. John Ackers some years ago established a Booth herd in Gloucestershire, withheld his choicest animals, and exhibiting those of secondary value, gained many Class and Champion Prizes at the Royal Shows; and Mr. Thompson, of Inglewood, the most successful exhibitor of Shorthorns this year, has been amongst the foremost at the Shows of several past seasons.

Both Scotland and Ireland have occasionally sent winners. In reference to Scotch successes at different periods, I may mention Mr. James Douglas, Sir W. Stirling-Maxwell, Lord Strathallan, Mr. A. Cruickshank, Mr. A. M. Gordon, and Mr. W. Duthie, as fairly representative of both exhibitors and breeders; and Irish breeders of English winners will be perhaps adequately represented if I introduce the names of the late Mr. Joseph Meadows, whose "Bolivar," afterwards Mr. C. W. Brierley's, was one of several celebrities produced in the Thornville herd;

¹ Since this was written the death of Mr. W. Hosken has been announced.—ED.

Mr. Richard Chaloner, whose "Anchor," exhibited by Lord Rathdonnell, was first in the Aged Class at the Kilburn International Show; and Mr. W. T. Talbot-Crosbie, the breeder of "Prince of Halnaby," the premier aged bull at Norwich three years ago.

These, indeed, are all truly representative men, but so are many others, and all we can do is to take an example or two of each class of exhibitors—the breeders who breed *and* exhibit, but with whom exhibition is a secondary purpose; those who breed *to* exhibit; those who exhibit to sell; the occasional amateur exhibitor; the thoroughgoing professional exhibitor, who breeds and buys and feeds and shows for a grand annual sweep of prize-money (of course this refers to the *past*—no allusion to present company), and all the grades between these classes. I must not, however, omit to mention the breeder of the illustrious "Queen Mary" and her kindred. The Rev. R. B. Kennard is not only a representative breeder on account of his southern locality, somewhat out of the well-worn tracks of the Shorthorn, but as one who propounded a theory of breeding and has illustrated in the show-yards its results when applied to practice.

There are two names which I have purposely reserved to the last, on account of the difficulty of introducing parenthetically in a list of names the remarks I should have to make upon them. I refer to the late Colonel Towneley and the Stratton family. But I am quite conscious that the list is but fragmentary.

Colonel Towneley's brilliant series of successes may be traced to his purchase of Mr. Eastwood's very select herd in the year 1848, and his securing the services of Mr. Culshaw almost immediately afterwards. He had, moreover, in Mr. Eastwood, a trusty friend in council. In the records of 1849 we find him successful in the Norwich Show-yard. From that occasion to the Worcester Show in 1863, his herd, comprising the choicest descendants of Mr. Waldy's "Barmpton Rose," a noted cow in the herds of Messrs. Wetherell and Watson, won its way to lasting fame. In March 1864, that herd was dispersed, but Mr. Culshaw soon afterwards got together a few "Barmpton Roses" and other good cows, and the Royal Premier bull, "Royal Butterfly," having been retained, and "Baron Oxford" purchased from Mr. McIntosh, the new herd soon began to rival the original herd in reputation. Prizes were won at Manchester in 1869, Oxford 1870, Wolverhampton 1871, and Cardiff 1872; but in May 1873 the second Towneley herd was sold under Mr. Strafford's sand-glass.

The name of Stratton is associated with a remarkable application of science and theory to practice. The late Mr. Richard Stratton, having thoughtfully observed the conditions under which the law that "like produces like" may be trusted to assert itself agreeably to the most literal interpretation, cared less for pedigree than for animals which his judgment approved as suitable for pairing. His original bulls were of good old families, and one sire, in particular, had extraordinary power in impressing his likeness upon his offspring. From that sire and a cow of unrecorded breeding, selected, however, as a genuine Shorthorn, he founded a remarkably fine family, and on the same lines he proceeded to breed a herd which constantly reproduced the best properties of the Shorthorn, and became very famous in the Show-yard. The type and style of his animals were those distinctively characteristic of the highly-improved Shorthorn, and were faithfully reproduced in successive generations. He used at an early period bulls of his own breeding, procuring fresh blood whenever his herd required it, but retaining his original families and returning to the use of his own bulls. His sons have followed his example. Mr. Richard Stratton, who has gained many prizes at the dairy and fat-stock shows, was an exhibitor this year at Windsor.

Looking back to the prize-list of 1851, when the Show was last held at Windsor, we find six English counties supplying twelve of the thirteen winners (York 3, Salop 3, Lancaster 2, Lincoln 2, Norfolk and Durham each 1), and the odd one was from an Irish breeder and a Scotch exhibitor. The successful exhibitors were Mr. T. Wetherell (1), Lord Hastings (1), Mr. J. Kirkham (1), Mr. T. Raine (1), Mr. T. Bentley (1), Mr. R. Booth (1), Lord Hill (3), Colonel Towneley (2), Mr. J. Douglas (1), and Mr. H. Ambler (1). The breeders not exhibitors were Mr. Lister Maw, Mr. F. H. Fawkes, Mr. Eastwood, and Mr. Turner (Kilcullen, Ireland). Mr. Wetherell's "Earl of Scarboro'," bred by Mr. Lister Maw, was the First Prize aged bull, and Mr. Booth's "Plum Blossom" (the dam of his bull "Windsor") the First Prize cow. The Shorthorn entries at Windsor in 1851 numbered, bulls eighty-nine, cows and heifers eighty-seven, total 176.

The Shorthorn Classes in the catalogue of the Jubilee Show at Windsor, exclusive of six entries withdrawn, contained 216 entries, or a total of 222 originally. They formed, on the whole, a good show of the breed. The colours were mostly of good, effective hues, with a sprinkling of white which pleasantly contrasted with the various shades of red and roan. It was noticeable that many of the better animals wore white stockings.

Class 75, Bulls of 1883-4-5, comprised ten entries, and (three being absent) seven animals stood together in the ring. The First Prize bull, "Mario," now exhibited by Mr. C. W. Brierley, was last year at Nottingham the First Prize and Champion bull, then exhibited by Mr. A. M. Gordon, of Newton, Aberdeenshire, bred by Mr. W. Duthie, of Collynie, in the same county. "Mario" has, without coarseness (his nicely shaped head, true proportions of frame, and level flesh being quite of the opposite character), a masculine presence. The ideal neatness which may be a right standard for heifers should not be applied indiscriminately to both sexes, nor, I would submit, to mature cows. How often we hear it said of a cow that she is growing "patchy," when really the development so described is only the normal growth proper to her years; and in the same way a bull is said to have "grown out of show form" when the strength belonging to his sex asserts itself in the rising, massive neck, and other excesses and rotundities of muscle. "Mario" has not developed these to anything like an extreme degree, yet he is unmistakably a bull, and his head, although of open, gentle, placid countenance, is a true bull's head. With all his scale he "keeps well together," as technical language puts it, and his top-line is firm and strong as ever. His colour is a pleasant, soft, grey-roan. Second in honour in the Class was Mr. John Vickers's "Royal Ingram," the red and white Premier bull at Newcastle two years ago, when he was shown by his breeder, Mr. W. Handley, whose Aberdeenshire-bred "Mac Beath," second winner last year in the Three-year-old Bull Class at Nottingham, and found in the Newcastle list among the Judges' Reserves, this year made a good Third; Mr. Brierley's "Aristocrat" again, as last year, having the Reserve Number.

Class 76, Bulls calved in 1886 (thirteen entries, no absentees, but one withdrawn entry), was a very fair class. The chief winner, "Prosperity," whose colour is a bright sort of roan with enough white to set it off to advantage, and frame symmetrical and ample in average width, the hind-quarters ending in square form, was bred by Mr. Thompson, Inglewood, and exhibited by Mr. Barnes, Wigton. He was placed, by the accident of arrangement, in the next stall to Mr. Hollins's "Pageant," his full brother in blood—that is to say, the two having one sire, "Mountain Chief 2nd," and their dams, "Pearl Armlet" and "Pearl Anklet," being own sisters, by "Beau Benedict" from Mr. Thompson's "Pearl Necklace 2nd." "Pageant" is a very useful-looking roan bull, with a strong reminder of his grandsire about the head, a characteristic feature of "Beau Benedict" which often crops out in his descendants. The second in honour was

the Duke of Northumberland's "Red Rover," red dashed with white over the hind feet, with a good top-line rising evenly from the chine into the arch of the neck, and flesh of good quality, springing under the touch and notably elastic in the covering of the hip and filling of the hip cavity. He was bred by Mr. Langdon, of Newbiggin. Another entry from Alnwick Castle, "St. Patrick," home-bred, had the Reserve Number, and between them in the prize-list was Mr. Cottam's Aberdeenshire-bred bull, "Flower Boy."

Class 77, Bulls of 1887, had thirty-one entries—two withdrawn, three absent, twenty-six in the ring. The Prince of Wales sent an excellent pair, "Oxonian" and "Dauntless," both bred at Sandringham, respectively representing the Bates and Booth herds, which His Royal Highness has kept distinct and on different farms. Both were Highly Commended, and "Dauntless," a rich red, had also the Reserve Number. He is of the beautiful "Diadem" tribe, from Mr. Donald Fisher's herd at Pitlochrie, Perthshire, but formerly bred at Windsor, and descended from "Cold Cream," one of the Prince Consort's purchases at the Fawsley sale in 1856. The tribe has been established at Sandringham for many years, and when seen a few years ago by the writer of this report, was remarkable for uniformity of character amounting to a strong family likeness, the head short, shapely, and pleasant-looking, and even the inward curve of the horns being alike almost throughout the tribe. The cows were of compact build, with well-expanded ribs and thick flesh. The other Sandringham bull, "Oxonian," a son of the Holker-bred "Baron Oxford 18th," from a "Barrington" dam, is a showy-looking bull of a very attractive roan colour, and possessing the kind of hair which Mr. Bates placed among the foremost characteristics of the improved Shorthorn.

In this Class was the Champion Shorthorn bull of the Show, Lord Polwarth's "Ironclad," a darkish roan son of the Warlaby sire "King Alfonso," from "Wave Surf," of Mr. Torr's "W" tribe, composed of Booth crosses upon the "Waterloo" foundation. Second for the Class prizes stood Mr. Hewetson's "Royal Warrior," also by a Warlaby sire, "Royal Riby," and bred by Lord Brougham from Mr. Marr's Aberdeenshire tribe of "Missie," with the "Heir of Englishman" cross, which stamped a grand character upon the Uppermill herd. The third winner, Mr. Handley's "Lord Frederick," hails directly from Aberdeenshire, where he was bred by Mr. Duthie, the breeder of "Mario." Among the other noticeable animals in this class was Mr. Hutchinson's thick-set, short-legged, spotted roan "Meteor," wide in the chest, good and strong along the

back, with good flesh-points all over, and a head and horns much of the old Warlabby character. His parentage is illustrious—his sire "Riby Star," the well-known Ardfert-bred bull, whose progeny have done exceedingly well in the show-yard, and his dam the famous "Lady Pamela," repeatedly a winner of the Society's first prizes and champion honours. It was said she would never breed. Mr. Thompson's "Master Smartly 7th" in this class, a "Beau Benedict" bull, carries a head as like his sire's as one bullet is like another cast in the same mould. The Duke of Portland's "Sir Victor," a son of Messrs. Mitchell's "Wanderer," of Mr. Torr's "W" tribe, has a vigorous, masculine presence, and "King George," from the same herd and by the Warlabby "King David," some good structural details. He might have done better if his colour had been of a richer hue. It looked sunburnt and faded, but his form and flesh are right.

Class 78, Bulls of 1888, contained sixty entries, two withdrawn, nine absent. The forty-nine brought together in the Show-yard formed a class of mixed merit, yet would have afforded material for several good classes of average number at district shows. The Queen and the Prince of Wales contributed not only to the number, but very considerably to the merit of the class, in which the First Prize winner was Her Majesty's "New Year's Gift," bred by Lord Lovat, at Beaufort Castle, Inverness. The award was another just tribute to the judgment manifested by the Shorthorn breeders of Scotland, and a due recognition of the excellence of the animal selected to represent the herd at the Prince Consort's Shaw Farm.

The Sandringham entries were both from the Bates herd, and both sons of "Baron Oxford 18th." One, "Orient," is own brother to "Oxonian," already noticed. After great painstaking, the Judges found in Mr. J. Deane-Willis's "Sir Douglas" their choice for the second place of honour, gave the Third Prize to Mr. Thomas Willis's "Heir of Windsor," and placed in the Reserve list Messrs. W. and J. T. Taylor's smart-looking roan bull, "Royal Windsor." Beyond the prizes, their only high commendation was to Captain Duncombe's "Renown," and they commended "Rupert" (one of the Sandringham bulls), Mr. Richard Stratton's "Merry Mowbray," the Marquis of Headfort's "Grand Duke of Waverley," and Mr. John Clark's "Warrior's Fame." Had they extended the list of commendations, as some Judges would have been tempted to do, seeing so much promise of future usefulness as there was in the class, they might have created for themselves a difficulty in deciding where to stop.

The Cows in Class 79 numbered twelve entries, and eleven

went into the judging-ring, nearly all of them very creditable to the breed. Mr. Thompson, of Inglewood, exhibited two, and got the First and Second Prizes for the stylish red-roan "Molly Millicent" and roan "Inglewood Gem," both previously distinguished winners, and the former remarkably combining with noble carriage symmetrical frame and excellent flesh-points, more than ordinary qualifications for usefulness as a dairy cow. She is of the right sort to breed bulls for the general improvement of the stock of the country. Mr. T. H. Hutchinson's "Glad Tidings," second to his champion "Lady Pamela" at Norwich, 1886, did well in taking a Royal Third Prize in her ninth year, and the Reserve Number was that of Mr. Darby's white "Lady Leodine," great in length of frame, in width through the chest, and in flesh with a large proportion of fat.

Class 80, Three-year-old Cows or Heifers, eleven entries, ten present, contained the Champion female, Mr. Thompson's "Belle Madeline," winner also of the Queen's Gold Medal as best Shorthorn, an honour generally allowed to be quite due to her. But in my opinion, in which many prominent breeders with whom I happened to converse concurred, the best Class of Shorthorns was Class 81, Heifers of 1887, forty-one entries, thirty-five in the ring, and among that number scarcely an indifferent animal. Mr. Thomas Stokes's "Gladys Rose" was thought by the Judges to be so near in merit to "Belle Madeline" that they placed her in front of the Champion Bull as Reserve for the Shorthorn Championship. The fact that two heifers should be adjudged better than the best bull is one worthy of note. The Windsor and Sandringham herds were here very well represented, as were also those of Colworth, Riby Grove, Rosedale, Loggans Mill, The Duffryn, and Alnwick Castle; and several other herds, besides those of Mr. Stokes, Lord Polwarth, and Mr. Gibson (the winners), contributed really good animals.

The Class of Last Year's Heifers, Class 82, forty-four entries, two withdrawn, three absent, contained also many good yearlings, but wanted weeding. The Queen's "Empress" was Highly Commended. The Duke of Northumberland's "Fairy Rosebud" (First Prize) is a thick, level heifer, wide-set on the fore-legs. The two next best were from Inglewood (one was a daughter of the First Prize cow), and Mr. C. H. Basset's "Lady Westaway Bates" stood fourth in the estimation of the Judges.

Report of the Judges of Shorthorns.

[Classes 75 to 82.]

CLASS 75—*Aged Bulls*—was not a numerous class. The animals placed were well-known previous winners.

CLASS 76. *Three-year-old Bulls*—Also not numerous, but contained several bulls of merit.

CLASS 77—*Two-year-old Bulls*—was a large and good one, which produced the Champion Bull. The animals placed were especially noteworthy.

CLASS 78—*Yearling Bulls*—was the largest among Shorthorns, but many of them would have been better at home. This remark does not, however, apply to the animals noticed, which were good.

CLASS 79. *Cows, in Milk or in Calf, calved previously to or in the year 1885.*—A small but good Class.

CLASS 80—*Three-year-old Cows or Heifers, in Milk or in Calf*—contained undoubtedly the best animal in the yard, and the Judges had no hesitation in awarding the QUEEN'S GOLD MEDAL for the best Shorthorn to No. 1098 (Mr. Robert Thompson's *Belle Madeline*).¹ The other winners in this Class were also good.

CLASS 81. *Two-year-old Heifers.*—Numerous and fairly good, the FIRST PRIZE, No. 1117 (Mr. Thomas Stokes's *Gladys Rose*), being also Reserve for the GOLD MEDAL.

CLASS 82. *Yearling Heifers.*—Again a well-filled Class; many, however, should not have been exhibited. The winners, nevertheless, were good, and not overfed.

A. MITCHELL.
GEORGE DREWRY.
L. C. CHRISP.

HEREFORD CATTLE.

Interesting historical particulars of the Hereford breed are given in the late Mr. H. H. Dixon's prize essay, in Vol. IV., Second Series, and some further notes, principally upon the characteristic properties of Herefords, appear in the contributions of Messrs. J. A. Clarke, J. C. Morton, and W. T. Carrington, in the fourteenth volume of the same series of the *Journal of the Royal Agricultural Society of England*. References to the breed are also to be found in the First Series of the Journal. About three years ago Messrs. Macdonald and Sinclair published a standard work on the *History of Hereford Cattle*, and the English *Hereford Herd-book*² and American *Hereford Record*³ supply

¹ For greater clearness the names of the animals mentioned, with their owners, have been added to the descriptions given by the Judges.—ED.

² The English work, commenced by Mr. T. C. Eyton, of Wellington, Shropshire, who brought out the first volume in 1846, passed, after the issue of the second volume, into the hands of Mr. W. S. Powell, of Hereford, on whose death before completion of the third volume it was, at the instance of the Herefordshire Agricultural Society, taken up by Mr. Duckham, who published in 1858, under the patronage of the Prince Consort, a complete edition of the third volume. He also revised and republished vols. i. and ii., and continued the work until 1878, when the present "Hereford Herd-book Society" acquired possession and appointed an editing committee. The volumes, beginning with the tenth, have been since issued annually by that Society.—W.H.

³ Vol. i. published in 1880 by the "Breeders' Live-Stock Association," Beecher, Ill., U.S.A.,

historical information. But, with the results of the labours of all the historians before us, we are still left in much doubt about the origin and date of origin of this now famous breed. Culley, writing in the latter part of the last century, on the authority of Mr. Ellman (understood to be Mr. Ellman of Glynde), describes the Hereford or Sussex as one breed, and his contemporary, Marshall, classes as kindred breeds the Devon, Sussex, Hereford and Gloucester cattle, with the cattle of North Wales. From some old pictures and old descriptions it would seem that cattle called Herefords had not only mottled but even red faces sometimes, so that, whatever the source of the white face, that marking does not appear to have been from any ancient period a distinctive characteristic of the Hereford. From a passage quoted from Speed (date 1627) it appears that more than two and a half centuries ago Herefordshire was noted for its cattle, as we read—"no place in England yieldeth more or better conditioned" (*History of Hereford Cattle*, chap. 1). As we do not find any reference to the striking peculiarity of the white face, we may infer the probability that it had not then become a general mark of the breed. Whether it came with the improved properties derived from Lord Scudamore's importation from Flanders, some time before the year 1641 (authority, T. A. Knight), or from some other source, earlier or later, we have no decisive evidence; and with regard to the speculation of Lawrence (1805) whether the white face of the Hereford came from the smoky-white face of the Montgomery breed, or *vice versâ*, we may dismiss it with the remark that whole-red with a smoky red face—not white—was always the distinctive colour of the pure old Montgomery breed. The weight of evidence seems to point to the Flemish cross as the probable source of the white face, and of some general improvement in the breed.

Long before the close of the last century, the prevailing colour of the Hereford was red with white face and usually white points—such as the feet and lower parts of legs, the under part of the body, and a line of white along the top of the neck. Old writers describe the red as commonly faint or yellowish, and this paler colour is still often seen; but the Americans have set the example of breeding for dark red, and this has been followed to a certain extent by English breeders. Grey, however, was no uncommon colour from sixty to a hundred years ago, and two grey parents occasionally produced white offspring—a result to this day, when grey Herefords, now scarce, are united.

When the Royal Agricultural Society of England began its

work fifty years ago, red and grey were both orthodox colours, although the red was much the more common colour. An American authority, Mr. A. B. Allen, has recorded that in 1841, when he happened to be over in England, he saw at the Society's Show at Liverpool some grey Herefords, and was much struck with their beauty and excellence. The spotted or mottled face was represented by a remarkable bull, "Maximus," from the Royal herd at Windsor, First winner in his class at the Battersea International Show, 1862.

Enormous size was more an object of the earlier breeders than of those of recent years. The live weight of Mr. Thomas Jeffries's "Cotmore," the Premier bull at Oxford in 1839, was 35 cwt. Those were the days of large oxen; these are the days of ripe steers. The modern tendency, from the demands of trade, and favoured by the lessons of the Shows, is ever to prefer symmetry and early maturity to size and weight, if those could be gained only at the cost of extra time and extra food. The breeder and feeder both want what the town tradesman calls "quick returns." For this object the more compact frame, level distribution of muscle, and rapid fattening at an early age, have been preferred to the greater scale, more open structure, and heavier but slower development of former days. Having secured the main objects desired, the breeder next gives his attention to size, and he has this advantage, that the weight of his cattle is not so much due to bone as it used to be, whatever may be owed to fat. The proportion of fat to lean certainly does increase, while that of bone to fat and muscle combined diminishes in the present as compared with the former model.

Both "Cotmore" and the cow which at Oxford was at the same time at the head of her Class had much of the "Hewer" strain of blood in them, the bull through his sire "Old Sovereign" and his dam's sire "Lottery," and the cow, Mr. John Turner's "Spot," through her sire, a son of "Old Sovereign." The Prize cow in the following year at Cambridge, bred and exhibited by Sir Hungerford Hoskyns, was also a daughter of "Old Sovereign." A son of "Cotmore," Mr. John Yeomans's "Royal," was the Royal Prize bull at Bristol in 1842; Mr. S. Aston's mottle-faced "Symmetry" was the "best bull" at Northampton in 1847, and Mr. Carpenter's "Coningsby," a descendant of "Old Sovereign," at York in 1848. The Duke of Bedford, Earl Talbot, and Messrs. P. Morris, W. Perry, T. Sheriff (Coxall), E. Gough, C. Walker, and E. Williams were among the principal successful exhibitors of mature Herefords within the first decade of the Society's existence, and besides the names already mentioned, we find in a list which I once prepared

of breeders from whose herds the blood of early winners was derived, the names of E. Price (of Ryall), John Price (Upton-on-Severn), Perry, Meire, Gough, the Tomkins family (of course), Sir Francis Lawley and the Rev. J. R. Smythies. Up to the close of the period covered by the foregoing notes, so far as I can judge from scraps of oral and documentary evidence picked up within the last five-and-twenty years, the younger Herefords, I infer, were not generally so forward in growth and in the furnishing of the frame as are those of the present time. Less attention was paid then than now to the capabilities of young stock. Lord Berwick, Mr. Pitt, and some other distinguished breeders, however, were successful exhibitors in the younger classes.

In the year 1849, ten years after the inaugural Show at Oxford, the Meeting was held at Norwich, where "Sir David," bred by Mr. David Williams, of Newton, Brecon, and exhibited by Mr. Edward Price, then at Court House, Pembroke, was the best aged bull. He had won his First Prize as a yearling at the Newcastle Meeting in 1846, and now stood invincible at maturity. The appearance of "Sir David" upon the scene marks an epoch in Hereford history, for the bull proved not only a winner at the Shows, but also one of the most impressive sires ever known, and from his day to the present time his descendants have been found in the foremost ranks of the Hereford breed. His influence was a new impetus to Hereford progress, and, although now distributed by time and interchanges of blood, is still traceable wherever the best Herefords are found.

At Windsor, in 1851, another extraordinary bull came to the front as first winner—Lord Berwick's "Walford," bred by Mr. Thomas Longmore. Lord Berwick was also on that occasion the exhibitor of the First Prize cow (the spotted-faced "Duchess of Norfolk"), the First and Second Prize two-year-old heifers, and the Third Prize yearling heifer, all the females being bred by himself. Mr. Edward Price, Mr. Fowler Boyd Price, Mr. Sylvanus Archibald, Mr. Monkhouse, of the Stowe, Mr. Philip Turner, Mr. Walter Maybery, and the Rev. J. R. Smythies were the other winning exhibitors, all being themselves the breeders of the animals which they exhibited, excepting Mr. Smythies, whose Second Prize cow was bred by Mr. Samuel Aston, and Mr. F. B. Price, whose First Prize yearling bull was bred by Mr. Jones, of Lower Breinton, and First Prize yearling heifer by Mr. Carpenter, of Eardisland. The Herefords numbered eleven entries of bulls exceeding three years old, eight of bulls from one to three years, six of cows, seven of two-year-old heifers,

and nine of yearling heifers, making a total of forty-one. Such was the Windsor Show of 1851. We shall perhaps better see the progress which the Herefords have made since the Society last visited Windsor if, instead of following the Shows from that year, and tracing the fluctuations in the representation of the breed, we take immediately for the purpose of contrast the Windsor Show of this year, only premising that excepting the cattle-plague year, 1867, when all cattle were excluded, every year's Show had separate classes for Herefords, which, with Shorthorns and Devons, have accordingly ranked from first to last as cattle of one of the leading national breeds. On some occasions interesting classes for groups or families have been added to the usual classes for single competition.

We have read of magnificent Shows of Herefords in America, and seen some splendid Shows in this country, but the Show that could beat, in number and quality combined, the Jubilee exhibition this year at Windsor must be a good one indeed. The entries numbered nine bulls of 1883-4-5-6, ten bulls of 1887, thirty-five bulls of 1888, twenty cows, fourteen two-year-old heifers, and thirty-three yearling heifers—total 121, or nearly three animals for each one shown in 1851. This total is twenty-three less than that of the entries at Shrewsbury in 1884, and of the 144 entries at Shrewsbury nine represented pairs of bulls, thirteen pairs of heifers, three groups of cow and two offspring, five groups of four two-year-old heifers, and twelve groups of yearling heifers—absentees not being noted in this enumeration. In single entries the Windsor Show is nineteen in excess of that at Shrewsbury, which numbered forty-three bulls and fifty-nine cows and heifers, against fifty-four bulls and sixty-nine cows and heifers at Windsor; yet at Shrewsbury, in addition to the groups and pairs, there were two more Classes than at Windsor, the elder bull and cow Classes, which at Windsor included three-year-old animals, being divided at Shrewsbury into separate Classes for the three-year-old and the older animals. Many more prizes, therefore, were offered to competition at Shrewsbury, and the show-ground was close to the doors of the Hereford breeders. The Shrewsbury Meeting, however, came so soon after the English Hereford herds had been thinned by large exportations to America, that the general wonder was how the breed could at that time muster so many animals of the excellent quality displayed on that occasion. The Classes at Windsor were of still higher average quality. The blanks left in the herds had been filled by subsequent increase, and the distance from home kept back most of the animals of inferior merit; hence the results—large classes and great excellence throughout.

Class 83, Bulls of 1883-4-5-6, contained nine entries. One animal was absent. Mr. H. W. Taylor's "Maidstone" began his Royal winnings in 1884 at Shrewsbury, where he was placed first in an excellent Class of yearlings, and described by the present writer in the official report of that Show (Journal, Vol. XX. S.S. Part II.), as "combining size and quality, and from present appearances likely to make a name in the future." His name is made. At Preston, in the following year, he was the First Prize two-year-old bull; at Norwich, 1886, the First Prize three-year-old bull; and at Newcastle, 1887, Nottingham, 1888, and Windsor, 1889, three years together, he has taken the first place in the First Class of bulls, and in an unbroken sequence of six years the Society's First Prizes. He also won this year the Hereford Breeders' Champion Prize as the best male Hereford, and had the Reserve Number for the Queen's Gold Medal. His size, at first glance, is less remarkable than it was for his age at Shrewsbury, because he is compact in structure and his frame evenly covered. Perfect proportion of part to part not being conducive to the immediate realisation of size, he requires to be seen for some time—seen at different distances and from different points of view—before his ample dimensions can be duly appreciated. He is a bull of illustrious breeding, a grandson of "Lord Wilton" through his sire "Franklin," and of "Tredegar," the Royal First Prize bull at Birmingham and Liverpool, through his dam "Duchess 4th."

Second in honour was Mr. Price's "Radnor Boy," bred by Mr. S. Robinson, Lynhales, a son of his "Highland Laird," and descended from "Horace" through both parents. Two different ways of development of a most generous flesh-growth were illustrated by this bull, and that in the next stall, Mr. Fenn's "Viscount Wilton" (Commended), bred by the late Mr. T. J. Carwardine at Stocktonbury. The former had that heavy growth which gives thick, rounded edges to the loin, and a cleft in the centre. Mr. Fenn's bull, of equally wealthy development, could not hold water on his back, the top, evenly packed and gently rounded to the sides, having no place for it to lodge in, but at the "catch" was heavily loaded, and the thighs were rounded to enormous masses overhanging the hocks. Next to Mr. Price's bull as a winner stood "Rare Sovereign" (Third Prize), bred and exhibited by the Earl of Coventry, and uniting the blood of the Royal Prize bulls "Fisherman" and "Good Boy" with that of Lord Berwick's famous herd through Mr. Hill's "Merry Monarch" (bred by Mr. Burton, Longner Hall), and the "Rarity" tribe. "Rare Sovereign" is the sire of the Champion female Hereford, and winner of the Queen's Gold

Medal, and is himself a fine illustration of the Hereford type, great in width through immediately behind the shoulder. His colour is somewhat of the old hue, liked very generally before the dark-red to meet the American fancy came into fashion—a rather paler colour, and covered with markings in a different shade, like drawings of miniature starfish. Mr. W. H. Cooke's "Grove Wilton 3rd," the Reserve Number—sire "Lord Wilton," dam's sire "The Grove 3rd," an excellent combination—has great scale and is of extraordinary depth from the shoulder to the point of the breast.

Class 84, Bulls of 1887, had ten entries, nine present. The Queen's "Favourite" (First Prize), a well-shaped bull of great length, on short legs, with clear yellow horns, was bred by Mr. John Price from the union of his "Monarch" and "Grand Duke" strains. The Earl of Coventry's "White Boy" (Second Prize)—why "white"? his colour is red, dappled like "Rare Sovereign's"; Mr. Fenn's "Downton Wilton" (Third Prize); Mr. A. P. Turner's "Salisbury" (Reserve), and Mr. Ralph Palmer's "Bombardier," dark red, and coloured up to the eyes, are the other judiciously honoured bulls in a creditable Class.

In Class 85 the thirty-five entries all came forward, so that the ring at judging-time looked well occupied, and the same may be said of the Judges. Whether the work was really as heavy as it seemed, or whether defects in some good-looking animals, unperceived at greater distance, enabled the Judges, with their opportunities of handling and closely comparing the rivals, to thin out freely, in either case the work was accomplished apparently without much difficulty, and Mr. Rankin's "Figaro," Mr. Hughes's "Endale" (bred by Mr. Yeld), and the Earl of Coventry's "Golden Sovereign," a son of "Rare Sovereign" and grandson of "Golden Treasure," a famous Royal Prize cow of previous years, were placed respectively First, Second, and Third, Her Majesty's "Luminary" having the Reserve Number. There was a good deal of character in some of the young bulls in this Class, and much scope for descriptive detail, but characteristics of yearling-bulls often alter so rapidly that it is scarcely safe to describe them except for immediate reading.

Class 86, Cows or Heifers calved previously to or in the year 1886, contained twenty entries, one of which had been withdrawn, and three cows were absent from their stalls. The Class as it stood in the ring comprised eleven cows calved before 1886, and five animals calved in 1886, three of the five over three years of age and in milk, two under three years of age and in calf. Without going into the question, "What is a heifer?" or "At what age or under what conditions does a heifer become a cow?"

we may here, for the sake of a comparison and of comment, draw a line between the group of eleven mature cows and the group of five younger cows or heifers. Local usage sometimes provides a convenient term which is not generally recognised, and in this case a local term, "heifer-cow," meaning an animal during the first "in-milk" period of her life, may be usefully applied to the three young mothers, and the two prospective mothers under three years of age may be called heifers. The difference between the two groups was as easily recognised as the difference between a bunch of full-blown roses and a bunch of opening rosebuds. The Judges preferred the rosebuds. They awarded all the three prizes among the three heifer-cows, Highly Commended one heifer and Commended the other, whilst nearly all the older cows had commendations, high or otherwise, and to one, Mr. Aaron Rogers's "Marchioness," the Reserve Number belonged. The Queen's fine Stocktonbury cow, "Mabelle" (a daughter of "Lord Wilton"), second last year at Nottingham, was one of those Highly Commended this year. "Rosewater," the beautiful heifer-cow bred and exhibited by the Earl of Coventry, came out as a yearling at Newcastle, where she had the Third Prize in her Class, and was last year First in the Two-year-old Class at Nottingham. She is now First in her Class, Champion female Hereford and best Hereford, winning the Hereford Breeders' 50*l.* Prize and the Queen's Gold Medal, in addition to the Society's Prize of 20*l.* as the best in her Class. It is difficult to compare a remarkable living animal with one, equally remarkable, of past years, but, allowing that certain differences of individual character might incline some judges to favour the one and some judges the other, "Rosewater" will probably take historical rank with Mrs. Edwards's "Leonora," the Champion Hereford at the Kilburn International Show ten years ago. Both will be remembered as animals closely approaching ideal perfection. The genealogical records of "Rosewater" are worth studying, to find the composition of so excellent an animal; but this is not the place for minute details of pedigree. Briefly and roughly stated, her antecedents trace through "Merry Monarch" and "Rarity 14th," grandparents of her sire, "Rare Sovereign," to some of the very best blood in Lord Berwick's celebrated herd, and to the old herd of Mr. Theophilus Salwey, of Ashley Moor, founded upon that of Mr. T. A. Knight; through "Rare Sovereign's" sire to the prize-winning herd of the late Mr. William Tudge, of Adforton, and to that of Mr. Thomas Rogers; and by her dam "Rosemary," "Rosewater" is descended from the noted "Rhodia" family of Mr. Philip Turner, of The Leen, and from the historical bulls "Horace" and "Sir Thomas" through "The

Grove 3rd." Mr. Arkwright's "Curly 23rd" (Second Prize) is what would be called in the North of England "a big one for her size," that is to say, not built on a large scale, but every inch of space about her turned to good account; and Mr. Fenn's "Bravura" (Third Prize), bred by the Earl of Coventry, has the easy aspect of a steady thriver, as if she had never been disturbed in her life, and considering that she calved at two years and nine months old, she has made good use of her time in an ample development of beef.

Class 87, Heifers calved in 1887, with fourteen entries, all present, made a creditable show of merit. Mr. A. E. Hughes's "Princess" (First Prize) fairly took the lead, closely followed by Mr. Arthur Turner's "Veronica" (Second Prize), both granddaughters of "The Grove 3rd," the first through her sire, "Cheerful," bred by Mr. B. Rogers, and she has the same strain again through her dam's sire, "Rudolph," the second through her dam "Venus 3rd," whilst through her sire, "Sir Edward," she is a granddaughter of "Lord Wilton." The Queen's large heifer "Jenny Lind" (Third Prize), bred by Mr. Richard Green, is also a granddaughter of "The Grove 3rd," through her sire, "Whitern Grove."

Only three of the thirty-three entries in Class 88, Heifers of 1888, failed to appear on the show-ground, so the Class was strong in number. It was also strong in merit. Her Majesty's "Rose," a thoroughly good "Auctioneer" heifer, led the field, followed by Mr. Price's "Lady Constance," whose sire, "Monarch," made her granddaughter to "Lord Wilton," her dam's sire being "Auctioneer." Mr. H. W. Taylor's "Mignonette" (Third Prize) has both the "Lord Wilton" and the "Tredegar" blood in her veins. Among the more noticeable heifers in this good lot of thirty were two more "Monarch" heifers, shown by Mr. Price, any one of whose three seemed good enough to win at most shows; Mr. S. Robinson's "Staunton Cherry" and "Princess Alice 5th," by "Rose Stock," and his "Woodmaid 8th" by "Highland Laird;" Mr. Arkwright's three heifers by "Hilarity," a son of "The Grove 3rd;" Mr. Fenn's pair, "Downton Fancy" (Reserve Number) and "Windsor Belle," both by "Bourton," a son of "Lord Wilton;" and a couple by "Good Boy," shown by the Earl of Coventry.

Report of the Judges of Hereford Cattle.

[Classes 83 to 88.]

The show of Herefords is one of the largest, and in point of excellence superior to any, ever held.

CLASS 83. *Bulls calved in 1883, 1884, 1885, or 1893.*—THE FIRST PRIZE

winner, No. 1191 (Mr. Henry W. Taylor's *Maidstone*), which also takes the CHAMPION PRIZE for the best Hereford Bull, is a wonderful animal, retaining his grand form in a marvellous way. No. 1194 (Mr. John Price's *Radnor Boy*) and No. 1198 (Lord Coventry's *Rare Sovereign*), the SECOND and THIRD PRIZE winners, are good stock bulls.

CLASS 84—*Two-year-old Bulls*—are a nice lot. No. 1200 (Her Majesty the Queen's *Favourite*), the FIRST PRIZE winner, shows first class style, and is of A1 quality. No. 1209 (Lord Coventry's *White Boy*) is more massive than his successful rival, but is somewhat deficient in quality. No. 1204 (Mr. T. Fenn's *Downton Wilton*) is a promising bull.

CLASS 85. *Yearling Bulls*.—A very large Class in point of numbers, but not of special excellence, with the exception of the prize winners.

CLASS 86. *Cows or Heifers in milk or in calf, calved previously to or in 1886*.—No. 1258 (Lord Coventry's *Rosewater*) is one of the best Herefords ever seen, not only winner of the FIRST PRIZE in her Class for the best Cow or Heifer in calf or in milk, but also of the CHAMPION PRIZE offered by Hereford Breeders for the best female, and of the Queen's GOLD MEDAL for the best Hereford. No. 1251 (Mr. J. H. Arkwright's *Curly 23rd*), the SECOND PRIZE winner, is a beautiful breeding heifer, full of style and quality, with a nice calf at her side. No. 1255 (Mr. Thomas Fenn's *Bravura*) is a very massive heifer, better adapted for exhibition at a Fat than a Breeding Stock Show. The cows on the whole are a wonderfully good level lot, but stand no chance against their younger rivals. This exposes the fallacy of exhibiting cows in competition with three-year-old heifers, which have carried off all the honours.

CLASS 87. *Two-year-old Heifers*.—This is a good Class on the whole, notably No. 1268 (Mr. A. E. Hughes's *Princess*) and No. 1272 (Mr. A. P. Turner's *Veronica*), the FIRST and SECOND PRIZE winners.

CLASS 88. *Yearling Heifers*.—This is another exceptionally large Class, embracing many most promising heifers. Upon no occasion have we seen so many animals in one Class worthy of commendation. No. 1279 (Her Majesty the Queen's *Rose*) and No. 1283 (Mr. John Price's *Lady Constance*), the FIRST and SECOND PRIZE winners, are equally true in outline, but the first-named shows rather more style and quality. No. 1291 (Mr. H. W. Taylor's *Mignonette*) is a good heifer, but exhibits signs of over-feeding.

FRANCIS EVANS.

WM. GROVES.

DEVON CATTLE.

Special interest attaches to Windsor, and to the first Show of the Royal Agricultural Society of England held there, in connection with the history of the Devon breed of cattle. The first issue of a Herd-book is certainly an important event in the progress of a rising breed. That event, for the Devons, bears date in the year 1851, and the place chosen for circulation was the Society's show-ground at Windsor. The work remained in the hands of the originator, Colonel Davy, through eight volumes, separated by long intervals, and was transferred to the "Devon Cattle Breeders' Society," by whom in 1884 the ninth volume was published. Supplements when necessary have been since issued, and vols. x., xi., and xii. bear date respectively 1887, 1888, and 1889.

The Devon is reasonably regarded as one of the oldest of our distinct breeds of cattle. By unconnected scraps of evidence found outside agricultural annals, the existence of a race of red cattle in the West of England, far away in the back centuries, seems clearly enough established, and much probability, if not some direct proof, connects our present breed with that ancient race. Indeed it is scarcely possible to doubt that the red cattle casually mentioned in ancient documents in connection with the south-west districts of England have left their prevailing colour and no doubt many of their characteristics—the type being very strongly pronounced—and that whilst the general characteristics of that type remain, special properties have been greatly improved by modern breeding. Longevity and fruitfulness appear to belong to the Devons in an extraordinary degree, and whilst their primary excellence is as a beef breed, their dairy properties are capable of very profitable development.

George Culley—whose *Observations on Live Stock* first appeared in 1786, a second and enlarged edition being printed in 1794, and reprints issued in 1803 and 1807—states, on the authority of “the ingenious and intelligent Mr. Mure, agent to Lord Dacre, who lately made an agricultural tour through the greatest part of England,” that “the Devonshire cattle are said to be found in the greatest purity and of the best kind in the vicinity of Barnstaple.” On the same authority he adds:—

“These are of a high red colour (if any white spots, they reckon the breed impure, particularly if those spots run into one another), with a light-dun ring round the eye, and the muzzle of the same colour; fine in the bone, clean in the neck, horns of a medium length bent upwards, thin faced and fine in the chops, wide in the hips, a tolerable barrel, but rather flat on the sides, tail small and set on very high. They are thin-skinned and silky in handling, feed at an early age, or arrive at maturity sooner than most other breeds. They are well fitted for draught, both as to hardiness and quick movement, their shoulder-points being beautifully fitted for the braham or collar.”

From the foregoing description of the Devons as “rather flat on the sides,” we are bound to infer that considerable improvement has been effected by their breeders since this account was written, about a hundred years ago; although Vancouver, in the year 1808, wrote that the Devons were then declining in their general standard of excellence and in number—a statement suggestive of fluctuations, sunnier days of the Devons in former years, possibly in former centuries, a falling-off in the energies of breeders, and consequent degeneracy of their cattle, and a revival of energy and merit, in breeders and cattle

respectively, between the first and the ninth decade of the nineteenth century.

Youatt (*Cattle: Breeds, Management and Diseases*), in his chapter on the Middle-horns, declares that "the truth of the matter is that Devonshire farmers were, until nearly the close of the last century, not at all conscious that they possessed anything at all superior to other breeds; but, like agriculturists everywhere else, they bought and bred without care or selection." He adds (writing about forty-five years ago): "It is only within the last fifty or sixty years that any systematic efforts have been made to improve the breeds of cattle in any part of the kingdom." The Devonshire men, he continues, were not the first to stir, nor the most zealous when they were roused to exertion, but "they are indebted to the nature of their soil and climate for the beautiful specimens which they possess of the native breed of our island, and they have retained this breed almost in spite of themselves."

Colonel Davy, however, the original editor and proprietor of the Devon Herd-book, in his short history of the *Rise and Progress of the Devon Breed of Cattle*, contributed as a prize essay to the Society's Journal (Vol. V. s.s. [1869] p. 107) twenty years ago, has recorded that "the Davy family have bred choice Devons for the last 150 years," but he refers to the drafts of many of the best (because they generally happened to be the fattest) animals from many of the breeding herds for slaughter, in consequence of the extremely high prices offered during the wars with America and France, and mentions also as a cause of decline the selections made by purchasers in other counties. A few, however, of the more spirited men of North Devon determined that the county should not lose all its best stock, and therefore refused all temptations to sell their choicest animals.

Foremost of that little band of breeders who interposed to stop the drain and arrest the decline of the Devon was Mr. Francis Quartly, of Great Champson, in Molland, a district which touches West Somerset. In Mr. (now Sir Thomas) Dyke Acland's *Report on the Farming of Somerset* (Journal, Vol. XI. [1850] page 680), a sketch of Mr. Quartly's practice is introduced in recognition of the good which eventually extended from his herd into the adjoining county. About the close of the last century "the principal North Devon yeomen were all breeders, and every week you might see in the Molton markets animals that would now be called choice. There were no cattle-shows in those days, and therefore the relative value of animals was not so easily tested." Then follows a reference to the war prices, and the temptation, to most breeders irresistible, to sell

their best stock ; and the remark that suggests itself on reading it is that a Royal Agricultural Society of England was greatly wanted in those days. In the absence of cattle-shows breeders had comparatively little inducement to sacrifice immediate gain for prospective reward, or for the credit of their county and the county breed. Honour, therefore, is due to the names of Quartly, Davy, Merson, Halse, Mogridge, Thorne, Tapp, and the few other breeders associated with them in the preservation of the breed at that critical period. Mr. Francis Quartly, although then in his youth, was a man of ripe judgment. He kept his eyes open, saw that good animals were becoming scarce, and quietly bought the best before strangers could take them out of the county. Once in his hands they were safe. Thus, blending the best strains of blood in the whole of North Devon, he founded that herd which in his own hands and the hands of his nephews, during a long period, was recognised as best of all, and became the source of the best blood in the herds of the present day. These facts deserve consideration in connection with the subject of "line-breeding," upon which narrow opinions have in some directions found favour. In dealing presently with the exhibitions of Devons at the Society's Shows, we shall have occasion to notice the influence of the "Quartly" cattle. For the moment it may be sufficient to add that soon after cattle-shows at Exeter were established, between fifty and sixty years ago, "Mr. Quartly allowed his nephews to enter in all the eleven classes." The result was they brought home the eleven prizes, and Mr. James Quartly, responding to the toast of "The Successful Exhibitors," owned that "he felt ashamed to think they should have been so greedy."

In an editorial paper upon the Canterbury Meeting, 1860 (*Journal*, Vol. XXI. page 514), Mr. Frere remarked : "It is to be regretted that the standard of excellence in this breed is to some extent a matter of debate." The reference will be understood by breeders of Devons in the present day. The controversy of that time may be worn out, but it would be vain to deny that a certain amount of sensitiveness still exists between the admirers of the gay North Devon, with its brilliant outlook and high finish, the beau ideal of high breeding and refinement, and those who prefer the more ponderous cattle of the Somerset type.

The North Devon, unquestionably, to an outsider presents in a greater degree than the larger and less animated-looking variety the character of an ancient and unmixed breed. The termed "unmixed" is not used here in the sense of literal purity or absolute freedom from admixture of alien blood, but to

indicate fidelity to an ancient type. An ancient breed may at one time and another receive crosses which destroy its claim to unbroken and literally or absolutely pure descent from its archetypal source, yet may so absorb those crosses, and by its excess, either of proportion or of hereditary power, or both, overcome them, that no trace of them is left. On the other hand, crosses may be introduced in sufficient proportion and of sufficient power to greatly modify the characteristics of the original race or breed; and even without alien blood, differences of climate and of the quality of pasture often effect, in the course of a few generations, considerable modification of type.

Such modification is almost always for the better, as regards the particular district in which it occurs. The tendency of animal and vegetable species alike is to gradually accommodate themselves to circumstances. A wealthy pasture grows big oxen, and if an immigrant small breed take the place of a native large breed, the tendency of the small breed is to lose its original character and in course of time adapt itself to new conditions, returning generous growth for generous sustenance, as the dwarf nasturtium in some rich garden soils changes its habit and becomes a climber or giant.

It is quite possible that in one district a small breed will thrive much better, and produce a greater weight of beef to the acreage, than a large breed, and at a smaller cost, although more mouths are employed in the consumption of the pasturage. The same may be said, of course, of dairy properties. Twelve small cows may yield more milk and butter, in return for less food, than ten larger cows; twelve small steers more and better beef, for less food, than ten larger steers of equal age. Yet in another district the more abundant or more forcing food grown on the land would be comparatively wasted upon the smaller breed. It requires a larger breed to make the most profitable use of it. These considerations, if duly taken into account, might lessen any remaining jealousy between the respective admirers of somewhat differing types in the race of cattle which takes its name from the county of Devon. Some difficulty in adjudication at shows must be taken for granted, and corresponding disappointment on the part of exhibitors of cattle of the one type or the other may be inferred; but when we have a recognised and highly valuable breed, like the Devon, and that breed possesses the convenient habit of easy conformity to various conditions of life, exhibitors can better afford to compete in a generous spirit than to differ about a few prizes. Their strength is in their unity.

The numbers of Devons exhibited at the National Shows have fluctuated according to distance from head-quarters and other

conditions, not always obvious. For instance, at the first Show, held in 1839 at Oxford (where, by-the-by, Mr. Paull's "Oxford," bred by Mr. W. Davy, of Flitton, was the First Prize bull), the aggregate number of entries was only fifteen; yet at Cambridge in the following year it rose to twenty-five. At Liverpool the distance northward sufficiently accounted for the decline to nine, and the nearness to the Quantock range and district southward when the Meeting was held at Bristol in 1842, brought up the number to forty-six. At that Show the First Prize bull, "Hundred Guinea," bred by Mr. John Quartly, and the First Prize cow, "Prettypaid" (No. 366 Devon Herd-book), bred by Mr. Francis Quartly, were a brother and sister, bred from Mr. Francis Quartly's celebrated cow "Curly" (No. 92 Devon Herd-book), a descendant of his most impressive bull "Forester" (No. 46 Devon Herd-book), who flourished about sixty years ago, and, without fear of contradiction, may be described as the richest source of prize-winning blood found in the records from that day to this. The entries after the Bristol Show, until the tenth year of the Society's existence, varied from eleven to forty-eight, the latter being the number at Norwich in 1849. The next year was a great one for the Devons, Exeter having been chosen as the meeting-place, and they gathered there to the strength of 123 entries, previously unexampled at a Royal Show.

At Windsor, 1851, when Mr. John Quartly's "Earl of Exeter," a grandson of the Bristol First Prize cow, was the First Prize bull, the entries numbered nine bulls exceeding three years old, twelve from one year to three years old (total, twenty-one bulls), fifteen cows, seventeen heifers not exceeding three years old, and twenty yearling heifers (fifty-two cows and heifers), making a grand total of seventy-three Devons, eleven short of the number at Windsor this year. The winning exhibitors in 1851, besides Mr. Quartly, who also had a Second Prize for a yearling heifer, were the Earl of Leicester and Messrs. Turner, Davy, Miller, Bond, and Hogg. Mr. George Turner, who exhibited the First Prize cow and was the breeder and exhibitor of the First and Second Prize two-year-old heifers and Third Prize yearling heifer, lived to the age of more than ninety years, and is remembered not only as a leading man in agricultural affairs, one of the Society's original members and a member of the Council, and as a prominent breeder and exhibitor of Devons, but also as a man of singularly happy and genial manner, young in heart when very far beyond the limit of ordinary human life. He died only about five years ago. Mr. James Davy in after years (nearly thirty years ago) succeeded to that foremost position among Devon breeders which

the Quartly family had held for the greater part of a century, and on his death, sixteen or seventeen years ago, left at Flitton Barton a herd glorious in the fame of "Temptress" and "Actress" and of the "Dukes of Flitton."

Without some special object, such as the consideration of different systems of breeding, selection of the names of a few of the most successful exhibitors at the Society's Shows between the Windsor Meetings of 1851 and 1889 might seem invidious. With regard to the number and quality of the Devons shown, the space available for this report does not allow us to trace the variations within those years. On the whole the Devon has firmly maintained its ground among the best and most profitable breeds of cattle. The Classes at this year's Show, to which we now direct our attention, will serve to illustrate its present high standing.

A general review of the Classes could not fail to impress the visitor with the high merit of the Devons in the aggregate. "A right good lot" was the opinion in which all seemed agreed before examination of the Classes in detail, nor did close and minute observation do otherwise than strengthen and confirm this estimate.

Before taking a systematic survey of the Classes in their order, we may refer for one moment to the Royal entries. The Queen exhibited very good Devons in four Classes, those of yearling bulls, cows or heifers, two-year-old heifers, and yearling heifers. Between thirty-three and thirty-four years have passed since the Prince Consort founded a Devon herd at Windsor by the purchase of Mr. George Turner's "Zouave," the winner of a First Prize at the Carlisle Meeting in 1855, and some choice animals from the herds of Messrs. Mogridge, Farthing, and Quartly. In 1856 His Royal Highness exhibited "Zouave" at the Society's Chelmsford Show, where the bull was again first in his Class; in 1858, at Chester, "Zouave" and "The Colonel," a son of "Zouave," both second winners in their respective Classes; in 1859, at Warwick, "The Colonel," again second; and in 1861, at Leeds, "The Colonel," Third Prize, "Crown Prince," Second Prize, and the cow "Ilex," winner of the First Prize. Smithfield and other honours were also won by the Windsor Devons up to that period. From that time Her Majesty's Devon herd has repeatedly won prizes at the principal shows, its high character being maintained by occasional introductions of fresh stock from the West of England; and in this year of Her Majesty's presidency and the Jubilee of the Society, the Windsor Devons were very well represented and received judicial commendation,

In six Classes, eighty-four entries were thus distributed: Class 89, bulls calved in 1883-4-5-6, numbered ten, all brought into the Show-yard; Class 90, bulls of 1887, nine entered, one withdrawn, four absent; Class 91, bulls of 1888, seventeen entered, all shown; Class 92, cows or heifers calved before or in 1886, sixteen entered, two withdrawn, one absent; Class 93, heifers of 1887, twelve entered, one absent; and Class 94, heifers of 1888, twenty entered, all shown.

The two Champion Devons stand out as pre-eminently good in a collection of very choice specimens of the breed. They are both descended, the cow only fourth, the bull fifth in descent, from "Flower" (189 Devon Herd-book), bred by Mr. Henry Quartly and purchased by Mr. James Davy at the West Molland sale in 1840. The pedigree in Vol. X. of the Herd-book ends with "Young Flower," but is extended in earlier records. "Flower" (189), through her sire, "Hundred Guinea," was a granddaughter of Mr. Francis Quartly's "Curly" by "Forester."

"Flower 2nd," the beautiful young cow which stands this year as Royal First Prize cow, Champion of the female Devons, and best of all the Devons (winning the Queen's Gold Medal), has a curious incident in her family history. A well-informed correspondent relates the following circumstances. Mr. John Smith, who had been in Mr. James Davy's service from boyhood, and was herdsman at Flitton until the dispersion of the herd in 1881, then entered the service of Sir William Williams. In Barnstaple market he recognised and purchased a heifer which had been sold at Flitton, with other heifers, to a Mr. Short, of Chittlehampton, on whose death they were resold, and thus Mr. Smith had the good fortune to secure for his employer "Flower 8th," the dam of the Windsor Gold Medal Devon.

At Newcastle two years ago "Flower 2nd" had only the Reserve Number and a High Commendation. At Nottingham last year she took the First Prize in the Two-year-old Class. She is a fine illustrative specimen of the Devon type, not on the largest scale, but moulded nearly to perfection—stylish rather than grand. Through her sire, "Eclipse," she is descended from Mr. James Davy's "Temptress," winner of the Gold Medal at Battersea.

Lord Falmouth's Champion bull, first in Class 89, "Lord Wolseley," has great substance and is grand in the fore-quarter and over the crops, with wide and thickly-covered ribs. In three consecutive years he has now taken the rank of Royal First Prize bull. Second and Third in his Class at Windsor were respectively Mr. J. C. Williams's "Marmaduke" and Mr. John

Howse's Newcastle first winner, "The Vicar," the former doubly grandson, the latter son, to Mr. W. Perry's York Royal First Prize bull, "Druid," whose progeny are frequently coming to the front in the Show-yard. Two or three other noted bulls also competed in the Class.

Mr. John Farthing's "Robin Hood" added to his previous winnings another Royal First Prize, but in a weakish Class of two-year-old bulls.

The yearling bulls, however (Class 91), made amends, and received a Commendation in the mass. Sir W. Williams's "Curlew," a son of "Foreman," of the Flitton "Temptress" tribe, was a deserving First winner even in that good Class of seventeen.

In the same Class with his Medal winner Sir W. Williams exhibited the Second Prize cow, "Fairmaid"; in the Two-year-old Heifer Class he showed the First and Second winners, "Foam 3rd," First at Nottingham and own sister to "Curlew," the First Prize yearling bull in Class 91, and "Flame 3rd," another of "Eclipse's" stock; and, in the Yearling Heifer Class, the First and Second winners, "Friendly 3rd" and "Fancy 4th," a pair of beautifully smart heifers—small they might be thought, indeed, but of exquisite symmetry, and of that genuine North Devon type which marked the whole of the Flitton herd, and is well preserved at Heanton.

Report of the Judges of Devon Cattle.

[Classes 89 to 94.]

The respective Classes were, as a whole, well filled with animals of great merit, but few of those entered failing to put in an appearance. Taken together, a better exhibition of this popular breed of cattle has seldom been seen in any showyard, although in consequence of the great importance attached to this the Jubilee year, a few animals were, as a matter of course, sent that would have been better in the stalls at home.

The CHAMPION Male Devon was found in CLASS 89 for *Aged Bulls*, being No. 1319 (Viscount Falmouth's *Lord Wolseley*). He is of great depth and substance, but deficient on the tail and rumps, also moving badly with his hind legs, which told against him in the final for the QUEEN'S MEDAL. The SECOND PRIZE Bull in this Class, No. 1321 (Mr. J. C. Williams's *Marmaduke*), well maintained the credit of his breeder, Mr. William Perry, of Lew Down. No. 1318 (Mr. A. C. Skinner's bull, *General Gordon*) was passed by us as out of form, with regret at his being sent, considering his former successes.

CLASS 91—*Yearling Bulls*—brought out a very promising animal in No. 1344 (Sir William Williams's *Curlew*) that will be heard of again.

CLASS 92—*Cows or Heifers*—produced in No. 1357 (Sir William Williams's *Flower 2nd*) the CHAMPION Female and the winner of the QUEEN'S MEDAL as the best Devon in the yard. Her fine quality, general thoroughbred style, and depth of flesh, gave her, in our opinion, the preference over the Champion Male, good as he is, for the Premier Honour. No. 1356

(Sir W. Williams's *Fairmaid*) wins the SECOND PRIZE, a very nice cow. No. 1360 (Mr. A. C. Skinner's *Duchess 17th*) THIRD PRIZE, No. 1354 (Mr. John Howse's *Daisy*) RESERVE NUMBER, and No. 1361 (Lord Falmouth's *Winsome*) HIGHLY COMMENDED, all good animals.

CLASS 93—*Two-year-old Heifers*—was a very useful lot.

CLASS 94—*Yearling Heifers*—was very strong in number and quality, which looks well for the future, as it contained many very good animals indeed.

EDWIN F. MAUNDER,
H. SIMMONS.

SUSSEX CATTLE.

In the days when golden grain filled with gold the coffers of the English farmer, and teams of oxen were commonly employed upon his arable land, the county of Sussex had a hardy old breed of cattle, second to none in constitutional stamina and untiring physical strength. The muscle, or lean flesh, was plentiful, and the oxen superannuated for draught purposes were fed up to great weights. As cereals became less profitable, beef a proportionately greater desideratum, and the horse and the steam-engine almost everywhere drove the ox from the plough, selection for a new main object wrought a gradual but marvellous change in the character of the cattle, and we have in the Sussex breed of to-day the recognised beef type, with greatly improved frame from a grazier's point of view, first-rate quality, early maturity, readiness to fatten, and an ample proportion of fat to lean in the fatted animal. The dairy properties, usually, are not great, not having been (except in a few instances) the object of special care; but, as in the Hereford, experiment has proved that much—perhaps everything desired—may be done in that direction by patient attention to the development of those properties, we may reasonably assume that the Sussex breed would answer to similar treatment if their development were desirable. A beef breed, however, that can use its legs, take kindly to the coarsest pasture and bear climatic changes, as the Sussex can, should not be too lightly turned to a purpose which implies a change of constitution. A Sussex Herd-book, edited by Messrs. Heasman, was founded more than twenty-five years ago. The Sussex breed has in America an enthusiastic friend in Mr. Overton Lea, whose successes as an exhibitor, both in the ring and under the block test, at the National Shows, have brought into notice the claim of the Sussex to rank with the leading breeds of heavy cattle.

During the first twelve years of the existence of the Royal Agricultural Society of England—1839 to 1850 inclusive—the Sussex cattle could compete only in the Classes open to all breeds excepting those which had special Classes from the first

—the Shorthorn, Hereford, and Devon breeds. For the first seven years those mixed Classes were open to any other breed or cross, and for the next following five years to any other breed, cross-bred animals being excluded.

At Windsor, in 1851, special Classes were first open to the Sussex breed, when twenty-two animals were entered—four bulls exceeding three years old, five bulls under that age, six cows, three heifers not exceeding three years old, and four yearling heifers. It may interest those Sussex breeders who do not happen to possess the back numbers of the Society's Journal to learn that, on this first appearance of the Sussex cattle at a Royal Show as one of the distinct and leading breeds of the country, the winning exhibitors were Mr. Henry Catt, of West Firle, Lewes, for a three-year-old bull; Mr. John Waters, of Motcomb, Eastbourne, for a yearling bull; Mr. Thomas Child, of Michelham, Hailsham, for a cow; and Mr. William Marshall, of Bolney Place, Cuckfield, for a two-year-old heifer and a yearling heifer.

The next year, 1852, the Show was held at Lewes, where of course there were special Classes for Sussex cattle. The entries numbered seventy-five, the Classes of bulls containing thirteen and ten, those of cows and heifers twenty-three, seventeen, and twelve respectively. We read in the official report on the live-stock at Lewes that "the Sussex cattle did not disgrace their native county, but sustained a good position amongst the other breeds of cattle."

Nine years then passed before special Classes were again granted to the breed, and it is curious to notice that whilst the Society within those nine years visited Canterbury, Chelmsford, Salisbury, and other places easy of access from Sussex, the Classes were not restored until the Show was held in the heart of Yorkshire—at Leeds, in 1861. In the meantime, competing with all comers in the Classes open to the unspecified breeds, and under conditions of uncertainty whether the Judges would give the preference to beef or dairy properties, Sussex cattle won prizes at Gloucester in 1853 and Chelmsford in 1856. At Leeds, in 1861, the only Sussex breeders who exhibited were Messrs. J. and A. Heasman, whose bull and heifer, the only entries, each received a prize.

The Battersea International Show in 1862 brought out the Sussex cattle in good strength, and they were officially reported by the Judges and Stewards of stock as good and decidedly improved, but the younger animals hardly equal to the older ones. "They had fine, deep flesh," one of the Judges wrote, "and quite maintained the improvement which they have shown

of late years at Smithfield," and the Stewards added, "Experience has proved them to be as hardy if not hardier on poor cold clays than any other breed."

From this time the Sussex Classes were continued yearly to 1868, missing only, in common with all cattle Classes, the two cattle-plague years, 1866-67. In 1864 they were included in the prize schedule of Newcastle-upon-Tyne—their first appearance at a Royal Show so far north. But the entries were few in number, and one of the Judges, Mr. H. W. Keary, remarked in his report that "The distance from home may account for the small number shown, but does not explain their great inferiority, as one would have thought that the best would be sent and the bad ones kept at home." The writer of the official report on the live-stock, Mr. J. Dent Dent, M.P., added, "Mr. Keary's remarks on the Sussex cattle confirm me in my opinion that it is unwise so far from home to offer prizes for any breed of cattle which have no particular merit to recommend them for adoption in other than their own locality. If the other breeds were over-fed, Sussex, at all events, were exhibited in a thoroughly natural state." This extract is given partly to indicate, in historical fairness, as accurately as possible, the character of the Sussex cattle shown at Newcastle a quarter of a century ago, and partly to introduce the obvious belief of a well-known authority that at that time the breed had no just pretensions to more than local importance. This view probably prevailed in the Council of the Society, for when the Society next travelled northward of the Midlands—to Manchester in 1869—the Sussex Classes were omitted. They were also omitted in 1870, when the Show was held at Oxford, but on that occasion a Sussex heifer had the Reserve Number in the general competition outside the Classes of specified breeds. Neither at Wolverhampton in 1871, Cardiff in 1872, nor Hull 1873, were they received back into the favoured group; but at Bedford in 1874 their Classes were restored to the schedule, but inserted after those of Channel Islands cattle, a position which they occupied for four years, after which they were reinstated to their former place immediately after the Devons, which they have held ever since.

For sixteen consecutive years, therefore—from 1874 to 1889—the Sussex breed has been established as one having a right to separate Classes at the Society's Shows, and to accompany the Society in all its travels, which have within that time included visits to Liverpool, Preston, York, Carlisle, and Newcastle-upon-Tyne; and for twelve years it has held its place in the group of first four breeds. At the Kilburn International

Show in 1879, there were eighty-five Sussex entries, and Mr. Bowstead, in his official report upon the cattle, observed: "Exhibitors of this hardy, beef-yielding breed cannot be too highly complimented on the extraordinary fine Classes they brought out at Kilburn. Many a one was heard to exclaim to those near him, 'But have you seen the Sussex cattle?' Equally with the Channel Islanders, they formed one of the main features of a generally splendid exhibition of the bovine race." The Classes were indeed good, exceedingly good, throughout, and it is worthy of remark that whereas in former years it was repeatedly said that the younger Classes compared unfavourably with those of full-grown animals, at Kilburn the younger Classes were exceedingly good, marking the progress of the breed in its development for early maturity. The yearling heifers were described by the Judges as "exceptionally good," and of the heifer calves, seventeen entries, the Judges wrote, "Never before were seen together such a grand lot of calves of this now acknowledged famous breed, not one of which was unworthy to compete at a Royal Show."

Taking the farthest points north at which they have been exhibited in the Society's Classes, we find them at Carlisle, 1880, favourably described by the official reporter, Mr. Finlay Dun, who noticed that much-needed attention had been paid to milking capabilities, and that Messrs. Stanford's First Prize cow, "Hardy," ten years old, and "victorious in many a show-yard, has, with other good points, a great square-set vessel, with teats well apart"; and Mr. James Macdonald, reporting upon the cattle Classes at Newcastle-on-Tyne, 1887, describes a small but creditable display of the Sussex breed.

Comparing the Windsor Show of 1889 with that of 1851, we find in one Class alone, that of heifers calved in 1888, as many entries—twenty-two—as there were in the whole of the Sussex Classes at the previous Windsor Show, and putting all the Classes together, a grand total of ninety-seven entries, or twelve more than at Kilburn. In an altogether fine show of cattle, as the Jubilee Show at Windsor unquestionably was, the Sussex Classes, especially those of females, were conspicuously good. The Sussex bulls have seldom been regarded by outsiders as equal to the cows and heifers, but for my own part I should hesitate to say that I wished to see them altered—which would mean to see them refined. There is a robust masculine character about them which I like, although it may not be commonly considered quite the right thing for the show-yard. The late Mr. Richard Booth, of Warlaby, used to keep his Shorthorn bulls generally in low condition. They were therefore not seen in

that abundance of flesh which smooths off the roughnesses of the distinctive male character, and visitors did not always appreciate the unfurnished frames of bulls very unlike steers or oxen. "How is it, Mr. Booth," they would ask, "that your bulls are so very inferior to your cows?" The veteran breeder, disdainingly to dispute the inferiority, would quietly answer, "I cannot tell you, but they are the sires of my cows."

Surely, if the Sussex breeders have not yet reduced their bulls to feminine fineness, nor shown them always in the condition of Smithfield steers, their cattle may rest their claims to favour as beef-makers upon the merits of the cows and heifers at the Royal and South-country Shows and the steers at Smithfield. The grand, massive character of the cows at Windsor, their wide-sprung ribs—a point of structure in which they have greatly improved of late years—their depth of girth, and, owing to increased roundness of rib, their now ample width through the heart, their deep, wide, and projecting breasts, their wide, strong, and thick-edged loins, and the wealth of good flesh upon their backs, with recently improved width across the chine (good "crops"), afforded weighty evidence of the competency of Sussex breeders to compete with the world in the production of beef-cattle, whilst the absence of grossness and the presence of style proved that they have advanced far beyond the stage of breeding in which size and substance, valuable in themselves, are unwisely allowed to put quality and symmetry out of sight. The shapely, sharply-cut head, bright, prominent eyes, and graceful fineness—not over-lightness—of the neck for a short space between the head and "neck-vein cushion," the "clean" bone of the legs (the term "clean" being understood to express that which is fine, as opposed to coarse, but not too slender), and the level moulding of the frame and superstructure are the "guinea stamp." They show the genuineness of the breeding. There is, I think, after the initial stages of improvement, this sort of evidence of artistic taste in nearly all the breeds of cattle that come from the hands of the cultured races of mankind—the Anglo-Saxon race, for example. Man begins to improve his cattle for utility, but he has a taste which is consciously or unconsciously brought into exercise, and impressed, as beauty, upon the breeds he develops. This characteristic of beauty has grown very much in the Sussex cattle of later years.

Having thus generalised the features of the show of Sussex cattle at Windsor, we need not go into details of description, beyond brief reference to any distinguishing points of particular animals. Class 95, Bulls calved in 1883-4-5 or 6, contained twelve entries, only one absent, and was headed in the Prize-list

by Mr. W. S. Forster's "Mikado," the First winner at Nottingham last year, a bull of remarkably heavy substance, packed evenly upon a frame of ample length, yet well kept together and well-proportioned throughout. He was bred by Mr. A. Holmes. The Second winner, "Gold Dust 11th," a very good bull, exhibited by Mr. Robert Whitehead, of Paddockhurst, was bred by Messrs. E. and A. Stanford, and is a son of their "Goldsmith," three times winner of the Society's First Prize in the Class for the oldest bulls admitted to competition—at Derby, Reading, and York. "Goldsmith," one of the best Sussex show bulls that has ever appeared, was the son of an extensive winner, "Young Hartley," and has transmitted to many descendants the merit which commands notice in the show-yard. Another very creditable son of "Goldsmith," also bred by Messrs. Stanford, Sir F. A. Montefiore's "Gold Dust 9th," took the Third Prize, an advance from his position at Nottingham, where he had the Reserve Number; and the Reserve Number this year belonged to another son of "Goldsmith," from the same herd, Mr. Lucas's "Golden Horn." Two other useful-looking sons of "Goldsmith," also bred by Messrs. Stanford, were shown in the same Class by Mr. Waterlow and Mr. Stewart Hodgson respectively. Mr. Vickress's "Woodmancote" deserved the High Commendation awarded, and Mr. Godman's "Nobleman," Commended, is the bull which took the second place last year at Nottingham. The Class altogether deserves to be called a good one.

At least as much general praise is due to Class 96, Bulls calved in 1887, nine entries, one absent. The "Berry" blood, which a few years ago was in especially high favour, asserts itself in Mr. Charles Child's "Jubilee," winner of the First Prize in his Class and the male Champion Prize and Reserve Number for the Queen's Gold Medal, as best of the breed. He is a young bull of remarkably rich substance and true proportions, well grown for his age, two years and four months. Mr. Godman's "Oxford Duke 1st" (Second Prize), Mr. Alfred Heasman's "Goldfinder" (Third Prize, another "Goldsmith" bull of Messrs. Stanford's breeding), the Aylesbury Dairy Company's "Clancarty" (Reserve Number), a son of "Mikado"; the Earl of Winterton's "Gold" (from Messrs. Stanford's sire, "Gold Dust 11th"); Mr. Churchman's "Butterman," Mr. Huth's "Fitzgerald 5th," and Earl Howe's bull of the same name and number, bred by Mr. Huth (the distinguishing number of one should be altered, to avoid future confusion), seemed a strong lot of competitors for the remaining honours, after "Jubilee's" claim to first place had been duly recognised, and as "Gold" had the prestige attaching to his Second honours at Nottingham, all

the more credit must be ascribed to the bulls placed in the Prize-list. Two or three of the rest, including "Gold," received commendations. Class 97, for Bulls calved in 1888, contained eighteen entries, two absent, and the competing animals ranged in age from under nine months to over one year and five months at the time of exhibition. They were like a lot of little lads and big lads together, the big ones at a stage of growth when bull or boy looks lathy, and neither one thing nor another, neither infant nor adult, whilst the little ones were scarcely past the baby age, and might grow out very good, very bad, or very middling. It was a good Class, nevertheless, taking the aggregate merit of all sizes, and Sir F. A. Montefiore's "Jupiter," entered without pedigree, but bred from the same herd which produced the Champion bull "Jubilee," made a good First winner, with age in his favour. The selection of the Judges, however, appeared to be rightly for type, form, and quality, due discount being allowed for differences of age.

Class 98, Cows and Heifers calved in or before 1886, seventeen entries, all in the stalls, was a grand Class indeed. It really did not contain a bad or middling animal. There was scarcely one that would fail to impress her individuality upon the memory, if seen alone. For the third year in unbroken succession, Mr. Waterlow's "Elsa" won the First Prize among the Sussex matrons, and she this year added to her Class Prize the Prize for the best Sussex female and the Queen's Gold Medal, as the best animal in any of the Sussex Classes. "Elsa," bred by her exhibitor, is a cow of that stamp which has been already described generally, and affords an illustration of the evolution of beauty together with useful properties, when the successive breeders have anything like educated taste mixed with the judgment of practical men. In the award of the Second and Third Prizes the winners at Nottingham changed places, Mr. Huth's "Lilly 2nd," last year winner of the Third Prize, taking the Second; and Mr. J. Stewart Hodgson's "Laura 7th," after taking the Society's First Prize at Preston, Third at Norwich, Second at Newcastle, and Second at Nottingham, this year having the Third Prize. Those honours were won in competition with the following excellent cows:—Major Mawdistly Best's "Auricula" and "Alice," Mr. Kirkpatrick's "Prebble," Mr. W. S. Forster's "Rosebud 1st" (Highly Commended), "Parade" and "Acorn"; Mr. W. Wood's "Little Lizzie," Mr. Alfred Agate's "Nutmeg" and "Beeswing," Mr. J. Godman's "Columbine 2nd" (Reserve Number) and "Comely 9th" (Highly Commended); Mr. W. Wood's, jun., "Berry 7th" (a cow of great scale and good frame, capable of much more furnishing), the Hon. J.

R. de Clare Boscawen's "Marigold 5th," and Mr. Huth's "Lilly 8th," a half sister to his Second Prize cow. The whole Class was most deservedly Commended by the Judges.

A splendid Class of nineteen Heifers calved in 1877, Class 99, was also Commended without exception. Here, again, there was not a vacant stall. The First winner, Mr. Barclay Field's "Primrose," by "Gold Dust 2nd," from a "Goldsmith" cow, and the Second, Mr. Vickress's "Noblesse," closely related by the sire and dam's sire to Mr. Child's Champion bull, were so evenly matched in merit that the two Judges of Sussex cattle could not settle between themselves which was the better, and eventually left the decision to one of the other Judges of cattle. Mr. J. Stewart Hodgson's "Peace 6th" and "Pride 7th" were respectively Third and Highly Commended, and Mr. Waterlow's beautiful "Marguerite," half-sister to "Elsa," had the honour of a Reserve.

Judging, at Midsummer 1889, a Class of twenty-two heifers calved at various dates from January 7 to August 17, 1888, cannot be a very easy task. The stage of growth is just that at which a month or two often makes a great change for better or for worse, and every breeder knows how individual animals, sometimes whole families and tribes, excellent at or near maturity, are plain in their earlier growth, and *vice versa*. Judging, therefore, such a Class, is partly guessing. It is quite possible that some of the unnoticed yearlings or calves before another show season comes round may "take the wind out of the sails" of their superiors at Windsor; and their so doing need not imply any discredit to this year's decisions. Of two beauties shown by Mr. Barclay Field, one had the First Prize and the Reserve Number for the Champion Female Prize—a bold compliment to a seventeen-months-old heifer.

Report of the Judges of Sussex Cattle.

[Classes 95 to 100.]

CLASS 95. *Bulls calved in 1883, 1884, 1885, or 1886.*—No. 1401 (Mr. W. S. Forster's *Mikado*) is a very massive, heavy-fleshed animal, well worthy of the FIRST PRIZE, a grand specimen of the Sussex breed, and although beaten in the competition for the Sussex Herd-book Society's Prize, was not disgraced. No. 1399 (Mr. Robert Whitehead's *Gold Dust 11th*) is a bull of great merit, taking SECOND honours; No. 1407 (Sir F. A. Montefiore's *Gold Dust 9th*) taking a good THIRD place. Some of the other Bulls in this Class were worthy of great commendation.

CLASS 96. *Two-year-old Bulls.*—No. 1411 (Mr. Charles Child's *Jubilee*) took the FIRST PRIZE in this Class, and is a splendid two-year-old bull, with great weight of flesh, and, taking his age into consideration, we felt compelled to give him the CHAMPION PRIZE for the best male Sussex exhibited; he was also RESERVE NUMBER for the QUEEN'S GOLD MEDAL. The winners of the SECOND PRIZE, No. 1409 (Mr. Joseph Godman's *Oxford Duke 1st*), and of the THIRD PRIZE, No. 1413 (Mr. A. Heasman's *Goldfinder*), were

also good specimens of the breed. The rest of the animals in this Class the owners need not be ashamed of, being nearly all either Highly Commended or Commended.

CLASS 97. *Yearling Bulls*.—This Class, as usual, was a most difficult one to judge, on account of the difference in age and size of the animals, some being much more developed than others, but the Judges feel confident that they have given the prizes where most merited.

CLASS 98. *Cows or Heifers*.—This Class requires special mention, and we regret we had not more prizes at our disposal, there being many animals well worthy of taking honours, and the Judges would respectfully ask the Council to extend the prizes to No. 1446 (Mr. Joseph Godman's *Columbine 2nd*), the RESERVE NUMBER.¹ The winner of the FIRST PRIZE in this Class, No. 1436 (Mr. W. B. Waterlow's *Elsa*), is also the winner of the Prize given by the Sussex Herd-book Society for the best Sussex Cow or Heifer, as well as of the QUEEN'S MEDAL for the best Sussex shown; and we have no hesitation in saying that she is one of the best animals that we have ever had the pleasure of giving a prize to, and well worthy of her position. The SECOND, No. 1451 (Mr. Louis Huth's *Lilly 2nd*), and THIRD, No. 1435 (Mr. J. Stewart Hodgson's *Laura 7th*), PRIZE winners, as well as the Reserve Number, are beautiful specimens of this valuable breed, and we have great pleasure in commending the whole Class.

CLASS 99. *Two-year-old Heifers*.—This is again a Class of beautiful young heifers, and the same remarks will apply as in CLASS 98, there being many animals well worthy of a prize. The Judges had in this Class great difficulty in deciding between the First and Second Prize winners, which they ultimately felt called upon to leave to reference. They again had no hesitation in commending the whole Class.

CLASS 100. *Yearling Heifers*.—No. 1484 (Mr. Barclay Field's *Berry 9th*), the FIRST PRIZE winner in this Class, was again a beautiful animal, well worthy of the distinction; she was also RESERVE NUMBER for the Sussex Herd-book Prize.

Several animals in this Class besides the prize winners will be heard of in future years.

The Judges cannot close their report without congratulating the breeders of Sussex stock on the excellent show at Windsor, both in quality as well as numbers, and they look forward with great confidence to seeing this useful breed take a very prominent place amongst the different breeds of the country, in view of the improvement made year by year.

RICH'D. HAMSHAR.
GEORGE NAPPER.

LONGHORN CATTLE.

The grand old Longhorn, Bakewell's breed, must ever hold the first place in chronological history of the scientific and systematic improvement of British cattle, and long may the type be preserved in its true grandeur and picturesque beauty. The iron constitution, the ample lean-flesh, and the abundant yield of exceedingly rich milk, especially as the Longhorn is reputed a small consumer, should appeal to the pocket as strongly as the wild majesty of the type appeals to the imagination, for these are days in which utility is appreciated, and they are days in

¹ This extra prize could not be granted by the Council.—ED.

which we cannot afford to let slip a robust and hardy breed of cattle like the Longhorn.

For abundant historical records the reader may refer to Mr. J. Nevill Fitt's valuable contribution in Vol. XII. Part 2, Second Series of the Journal, bearing the date of 1876; also to Mr. J. B. Lythall's condensed yet comprehensive history given as introductory matter to the Longhorn Herd-book two years later. We need not here enlarge upon the improvement—nay, the transformation—under the magician's hand at Dishley, nor particularise the minor and earlier improvements.

Although an area comprising the Craven district of Yorkshire, the southern border of Westmoreland, and that part of North Lancashire which strikes its wedge-end in between Westmoreland on the north-west and Yorkshire on the north-east, was the northern stronghold, if not the fountain-head, of the original breed, Bakewell concentrated the strength of the Longhorn in the Midlands, and a Midland breed it remains to this day, while its old homes in the North have been long occupied by the supplanting Shorthorn, only tradition, a few old portraits, and the boyish recollections of some of the very oldest inhabitants, recalling the glories of the Longhorn.

During the first twelve years of the Society's Shows, 1839–50, this once dominant breed was relegated to the mixed Classes, including, for seven years, 1839–45, cross-bred cattle. From 1845, pure breeds only were allowed to compete in those Classes. The Longhorn in miscellaneous assemblies repeatedly bore away the honours, notably at Gloucester in 1853, when two Prizes were won; Lincoln, 1854, all the Prizes; Worcester, 1863, First Prize (bull); Plymouth, 1865, two First Prizes; Leicester, 1868, First and Second Prizes for bulls, all the Honours for cows, and First Prize for a heifer; Manchester, 1869, two First Prizes (bull and cow); Oxford, 1870, First and Reserve for bulls, First and Reserve for cows, and Second in the yearling heifer class; Wolverhampton, 1871, First and Second for bulls, First and Reserve for cows, Second and Reserve for heifers; and at Cardiff, a Second Prize. Where dairy Classes only have given admission to miscellaneous distinct breeds, we do not find the Longhorn. As dairy cattle exclusively, they would perhaps not compete on equal chances with breeds raised expressly for dairy purposes.

Special Classes for Longhorns were first introduced at Windsor, in 1851; secondly, at Warwick, 1859, when the local committee gave prizes for Longhorns, and there was a really fine show of the breed, a splendid Class of Longhorn cows in pairs being quite a leading feature of that year's exhibition; and thirdly, at the Battersea International Show, when the cows were

much admired. The next occasion for special Longhorn Classes was at Birmingham, 1876, when the prizes offered by the local committee drew together a most memorable lot of Longhorns. A decided improvement in the development of the heifers for their ages, as compared with Longhorn heifers of former days, was generally remarked. At that Show the late Duke of Buckingham was a prominent exhibitor, taking First Prizes for "Conqueror 3rd," and "Marquis," "Lady Twycross" and "Countess of Temple," and a Second Prize for "Barnmaid," the four last by "Conqueror 3rd," who was a First Prize winner also at Liverpool and Bristol. Including 1876, for nine consecutive years special Classes were granted to the Longhorns. At Liverpool in 1877 the prizes were again given by a local committee, but by the Society in 1878, when the Show was held at Bristol; 1879 (Kilburn, International Meeting), where Major-General Fitz-Wygram's "Prince Victor" and the Duke of Buckingham's "Countess of Temple" were the Champions; 1880 (Carlisle), 1881 (Derby), 1882 (Reading), 1883 (York), and 1884 (Shrewsbury), from which time they were discontinued until this year, when they were restored at Windsor, to the extent of one class for bulls and one for cows and heifers of all ages.

Class 101, Bulls of any age, contained five entries, and Class 102, Cows or Heifers of any age, six entries. In this small total of eleven, however, considerable merit was found. All the bulls and four cows received judicial notice. The First Prize and the Queen's Gold Medal were awarded to "General," a three-year-old brindled bull with blue-grey cheeks, a good specimen of the old type, bred by Mr. S. Forest, of The Chase, Kenilworth, and exhibited by Mr. W. Griffiths, of Mold. "General" is a grandson of "The Captain," Mr. Godfrey's Second Prize two-year-old bull at Bristol, and he, through "The Blue Knight" and "Upton 1st," traced in the direct male line to "Old Sparkenhoe," the Plymouth Royal winner in 1865, a very noble-looking and well-remembered bull. Mr. Causer's Second winner represents the Calke Abbey herd.

Lady Mary Morgan, whose "Conqueror 6th," Commended in Class 101, has a head worth the attention of an art-student, exhibited the First Prize and Reserve cows, "Adelina" and "Lady Twycross 4th," the latter descended from two of the Duke of Buckingham's winners at Birmingham in 1876, "Conqueror 3rd" and "Lady Twycross." Mr. Satchwell's "Emily" (Second Prize), and a cow named "Lily" (Commended), bred by him, but exhibited by Mr. Bates, of Malvern, both trace through his "Lady Forest" to "Blue Bull," of Rollright ancestry.

Report of the Judge of Longhorn Cattle.

[Classes 101 and 102.]

The Longhorns exhibited were few in number, but most of them possessed the best characteristics of this fine old breed.

J. H. BURBERY.

WELSH CATTLE.

Hitherto separate breeds have engaged our attention; two of them, indeed, the Shorthorn and the Devon, breeds with strongly marked variations of type, or sub-types, yet each not more than one breed. The classification in this section is less definite, and leaves room for the admission of different breeds. "Welsh cattle" is a term which covers not only the kindred although differing types of Anglesea and Pembroke-shire, but also those of Montgomeryshire and Glamorganshire; all, in fact, whether unaltered types of the cattle of the aboriginal Britons, or divergent types obtained by selection or by cross-breeding. Some discussion occurred five years ago when a couple of smoky-faced Montgomeries appeared among the black Welsh cattle at Shrewsbury. Admirers of the black cattle looked upon the red as interlopers; admirers of the red thought them unfairly handicapped in competing with the black, popularly recognised as the cattle of the Principality. Still, a very little effort of memory would have served to allay any feeling of dissatisfaction on that ground, because at Cardiff, in 1872, two out of the three Prizes in the Yearling Bull Class of mixed Welsh breeds were awarded to red Montgomery bulls.

A Herd-book for the registry of the cattle of South Wales is now the property of a society formed to promote the improvement of the breed and maintain its purity, and to carry on the Herd-book, as established by the late Mr. Richard Hart Harvey, of Slade Hall, Haverfordwest. The first volume, compiled and edited by Mr. James Bevan Bowen, of Llwyngwair, was published in 1874. Two volumes, edited by Mr. Harvey, were issued respectively in 1878 and 1883, and the fourth volume, edited by Mr. James Thomas, of Haverfordwest, the secretary of the Society, was published in 1888. In 1883 the North Wales Black Cattle Society brought out the first volume of their Herd-book, under the editorship of the late Mr. William Dew. On his death his office devolved upon Mr. W. A. Dew, by whom the work is ably continued. Authoritative descriptions of the respective breeds are given in the two Herd-books.

At the Society's Shows, for twelve years from the beginning, Welsh cattle had access only to the Classes for "Other Breeds," whilst the Shorthorns, Herefords, and Devons, at all those

Shows, with the addition of South Hams at Exeter in 1850, had each special Classes. At Windsor, in 1851, the general competition was reduced by the extension of special Classes beyond Shorthorns, Herefords, and Devons, to Longhorns, Channel Islands breeds, the Sussex breed, Scotch Horned cattle and Scotch Polled cattle. The Welsh, indeed, were mentioned by name in the schedule, but in conjunction with "Irish and other pure breeds." At Lewes, in the following year, the only addition to the most favoured three was the Sussex breed; but in 1853, at Gloucester, special Classes were for the first time provided for Welsh cattle. On that occasion no entry was made for the 20*l.* and 10*l.* Prizes offered for the older bulls, but in the younger Class the Prize of 10*l.* was awarded to Mr. Wm. Powell, of Eglwysnunydd, Glamorgan-shire, for his yearling "dark brown and white Welsh bull, 'Prince'"; the same exhibitor taking the Prize for the best Welsh cow, "Pretty," black and white, and for the best Welsh heifer, his brown and white two-year-old "Spot." From these descriptions and the locality, the breed of these winners, all bred by the exhibitor, will be readily inferred. A black cow and black yearling heifer, bred and shown by Mr. G. Goode, Carmarthen, took the inferior Prizes. At Warwick, 1859, in general competition, a Welsh bull exhibited by the Hon. Col. Pennant (afterwards Lord Penrhyn) took the First Prize in his Class. At Battersea (International), 1862, not only Welsh cattle, but the cattle of North and South Wales separately, had special Classes, but four of the five Classes for the former were blank, and in the remaining Class (cows), one exhibitor, Mr. R. H. Harvey, although a Pembrokeshire man, took both Prizes for animals of the Anglesea variety, whilst in the South Wales Classes he was a successful exhibitor of the Castlemartin variety. A Castlemartin bull stood alone in his glory, and two First and two Second Prizes, together with one Reserve, for South Wales cows and heifers, were awarded to the entries of Mr. Clare Sewell Read.

Passing over further competition in mixed Classes, a haphazard contest at the best, inasmuch as it is impossible for any Judges to say fairly and decisively which is the best of animals of totally different character for totally different purposes, we confine our attention now to the Shows at which Welsh cattle had special Classes. At Manchester, 1869, they were few in number, but good specimens were exhibited. The Cardiff Show, 1872, was strong, but not so strong as the Society's official reporter thought it might have been in Welsh breeds; nevertheless, a favourable report was sent in by the Judges, especially

praising the Castlemartin variety. At Liverpool, 1877, both North and South Wales sent their breeds in great strength, quality as well as number considered. It was an extraordinary Show, and the Judges in their report pointed out the difficulty they had in deciding between cattle of such totally different types, and recommended separate Classes for the two varieties at future Shows. The prizes were given by a local committee. In the following year the Show was held at Bristol, and prizes were offered for Welsh cattle by noblemen and gentlemen residing in Wales, but the recommendation of the Liverpool Judges, to separate the breeds, was not carried out. The Judges at Bristol did not refer to difference of type, nor to any difficulty in judging beyond that arising from the thorough excellence of the Class of nine cows, which they described as "magnificent." The extraordinary merit of the First Prize two-year-old heifer was specially noticed in their report, and the wonderful size of the yearling heifers mentioned as an indication of what may be done by means of early generous treatment. The Judges noted "a marked improvement" generally upon the Liverpool Show.

The Kilburn International Show, 1879, although held so far from Wales, was rich in Welsh cattle, but from that year we have a four years' hiatus. Reappearing at York, 1883, the Welsh Classes contained only eight entries, but all good animals. The prestige of the breed, however, on that occasion, rested upon the contributions of two exhibitors, the Earl of Cawdor and Lord Harlech. From that year the Welsh breeds have been more extensively supported at the Shows. At Shrewsbury, 1884, many breeders exhibited, the black breeds gathered in great force, and the several types of Anglesea, Pembrokeshire, and Montgomeryshire were duly represented. So near their home, the Welsh cattle could scarcely fail to form a strong section of the exhibition. More significant of their progress is the fact that at subsequent Shows held in various and distant parts of England, they have most creditably asserted themselves. At Preston, in 1885, twenty-seven animals, composing five Classes, entered the ring, the same breeds as at Shrewsbury being well represented. The Classes at Norwich, 1886, were well filled, and only one was weak in merit. At Newcastle, indeed, they were missed, but their welcome reappearance at Nottingham last year, comprising animals of the highest order of merit, indicated both an increased general interest in the breeds of Wales, and a lively interest, in particular, on the part of owners to whom pecuniary profit is comparatively unimportant—whose generous object is to develop, and, through the instrumentality of the Royal Agricultural Society of England, to bring into more

general notice, the capabilities of the Welsh breeds of cattle. Those breeds have unquestionably vast capabilities of both milk and beef production, and their rude health is an important recommendation. Where hardy, active cattle are required—cattle which can live roughly yet answer to keep and care, grow beef of the first quality and under favouring conditions great in quantity—the Welsh breeds should claim a trial, and they would doubtless prove ready to adapt themselves to districts and countries to which hitherto they have been strangers.

The Show at Windsor this year afforded evidence that their advance continues. Their six Classes contained forty-nine entries, and thirty-four animals received cards, denoting either Prizes or Commendations, some of the latter "very high." One whole Class, that of yearling bulls, was commended, and in two other Classes, those of two-year-old bulls and two-year-old heifers, every animal had a card for individual merit. The northern breed prevailed in number of entries and in prize-winning.

Class 103, Bulls of 1883-4-5-6, comprised large, massive, and very handsome animals, as good to the touch as to the sight. Colonel Platt's "Prince Frederick" (First Prize), whose flesh is laid on thickly and evenly, extending along the sides of the neck almost to the head, was bred by Mr. Oakeley, and last year, in Colonel Platt's hands, was second to his "Ap Gwilym" at Nottingham. The second winner, "Owain Ap Gwilym," exhibited by Mr. Sandbach, was bred by Mr. Jones, of Taihirion, the breeder also of "Ap Gwilym" himself. Lord Harlech's "Ulundi" (Third Prize), bred by the Earl of Cawdor, unites the breeds of North and South Wales, and is a son of the Norwich First Prize bull "Zulu," bred by Lord Cawdor and exhibited by Lord Harlech at the Norwich Show. Indeed, in all these bulls the blood of winners in previous years is traceable on analysis of the record of pedigree. Two sons of "Ap Gwilym," Colonel Platt's "Cromwell" and "Nicolas," were respectively First and Second in the Two-year-old Class (104), and "Cromwell" took the Championship of the male Classes. Lord Harlech's "Jevan" (Third) is remarkable for the thickness of flesh on the crops. In a capital Class (105) of yearling bulls, Col. Platt's "Latimer," another of "Ap Gwilym's" stock, took the leading place, closely followed by a Pembrokeshire bull, Mr. Evans's "Tit Bits"; while among some wonderfully good cows, including Colonel Platt's "Princess Joan" and "Princess Jonet" (Second and Third), Mr. Oakeley's "Topsy" was the chief winner. The best of all, however, was Colonel Platt's two-year-old heifer "Yudno," winner of the First Prize, Champion Female Prize, and the

Queen's Gold Medal—another score for “Ap Gwilym” as a sire. Mrs. Williams, of Llandilo, showed a beautiful Pembroke heifer, “Eirena” (First), in the Yearling Class, in which Mr. Oakeley's two heifers (Second and Third) reflect much credit upon “Harlech,” and Mr. Dunlop's two upon “Duke of Chester,” as their respective sires.

Report of the Judges of Welsh Cattle.

[Classes 103 to 108.]

We are gratified to report great improvement in this stock. In Class 103, for *Aged Bulls*, are some noble animals combining size with quality; but we found the CHAMPION Male in Class 104, No. 1512 (Col. Henry Platt's *Cromwell*), a most promising two-year-old bull. The *Yearling Bulls* are commended as a Class.

Many of the cows in Class 106 are of great merit, especially the prize winners, the FIRST PRIZE cow, No. 1534 (Mr. W. E. Oakeley's *Topsy*), being placed as RESERVE NUMBER for Her Majesty's Gold Medal for the best Welsh animal.

CLASS 107—*Heifers calved in 1887*—furnished the winner of the CHAMPION PRIZE for best female, No. 1540 (Col. Henry Platt's *Yudno*), also Her Majesty's GOLD MEDAL for best animal in the Welsh Classes. All the heifers in this Class are honourably noticed.

CLASS 108—*Yearling Heifers*—are a nice lot without calling for special comment.

W. B. ROBERTS.
JOHN WILLIAMS.

RED POLLED CATTLE.

Made one by interfusion and selection, and for upwards of thirty years recognised as one breed under the name of Norfolk and Suffolk Polled, for which the present name was substituted at the Society's Shrewsbury Show in 1884, the old dairy breeds of Suffolk and Norfolk, improved for the grazier, have assumed the distinct type with which visitors at the Society's Annual Shows are now familiar. It is a breed well adapted to dairy purposes and beef-making—and specially suited to a certain district, but that assuredly not the only district in the world for which it is a specially suitable breed. “Outsiders” cannot always prescribe the best rules for the “insiders” of a given district. At the Royal Shows the breeders of Red Polled cattle see them side by side with the cattle of various rival breeds; they are shrewd men, and it is impossible to doubt that if they see any lingering defect they will do their best to breed it away, if they can be sure that in so doing they will not lose something of more importance than that which they would gain. Good dairy properties, good quality of flesh, and a ready tendency to fatten, in cattle of medium size, not too large for poorish pasture, and hardened to a coldish climate, are highly valuable

characteristics, and make the Red Polled breed suitable for conditions of existence which would be very unfavourable to many of the heavier breeds.

When the Royal Agricultural Society's Show was held at Norwich, just forty years ago, the breed was not even recognised by name in the prize schedule, and of the eight prizes given for cattle of any breed not qualified to compete as Short-horn, Hereford, or Devon, four were won by Longhorns, two by Ayrshires, one was awarded to Lieutenant-Colonel Mason, of Necton Hall, for his "Blood-red Norfolk Polled bull," bred by Mr. Whytock, and one to Lieutenant-General Sir Edward Kerrison, Bart., for a Suffolk bull bred by himself. In several of the early years prizes were won by Norfolk and Suffolk cattle in general competition, notably at Windsor in 1851, when they took all the prizes, and at Chelmsford in 1856, when five prizes were adjudged to them. They also won at Gloucester, Chester, and Warwick; and at Leeds, 1861, Lord Sondes successfully exhibited specimens of the Elmham herd.

At the Battersea Show, 1862, where special Classes were granted to the "Norfolk and Suffolk Polled" cattle, they mustered "nearly as strong as those of Sussex," the official report says, and, quoting the comments of one of the Judges, continues, "presented several specimens of great merit, size, and symmetry, with good flesh and constitution and plenty of lean to the fat—all qualifications for making as much good beef at the least possible cost from a given quantity of food as any breed in the yard." Another Judge remarked great improvement in the breed, especially in the younger animals. At Worcester in the year following, although the special prizes were dropped, the Red Polls came out very strong in the Prize List, and at Newcastle, in 1864, made a clean sweep of the prizes. They held their ground well in mixed competition in the succeeding years until 1870, when at Oxford they had again special Classes, and next year also, at Wolverhampton. In the two next following years, 1872–3, the special prizes were suspended, yet at Cardiff the Red Polls won five principal prizes in miscellaneous Classes, and at Hull again won all the prizes. At Bedford, 1874, the year in which the first volume of *The Norfolk and Suffolk Red Polled Herd-book*, edited by Mr. H. F. Euren, was published, they had once more special Classes; at Taunton, 1875, and at Birmingham, 1876, there were neither special Classes for them nor Classes, except at Birmingham two dairy Classes, open to unspecified breeds; at Liverpool they were admitted to special Classes once more; at Bristol dairy Classes only were open. Then came the Kilburn International

Show, 1879, where their Classes were restored, and in that and each subsequent year they have ranked with the recognised breeds of the country.

At Windsor, in 1851, the winners of all the five prizes offered for pure but unspecified breeds were Suffolk cattle. In 1889, therefore, they returned to the field they won so many years ago, but no longer as a merely local or an unrecognised breed. They filled six Classes, with a total of seventy-two entries, distributed thus:—Bulls of 1883-4-5-6, fifteen; bulls of 1887, seven; yearling bulls, nineteen; cows or three-year-old heifers, eight; two-year-old heifers, thirteen; and yearling heifers, ten. The first Class of bulls (109) contained the Champion male and winner of the Queen's Medal, Mr. H. P. Green's "Wild Roy," Mr. Alfred Taylor's "Bardolph" (Second), and Mr. Colman's "Iago" (Third), taking the same places as at Nottingham last year. The Judges commended the whole Class. In the next class (110), Mr. A. Taylor's "Nimrod," Third last year, rose to the first place of honour; last year's First, Lord Hastings's "Viceroy," having the Second Prize at Windsor. The bulls in the Yearling Class (111) are at the awkward age for exhibition, when many that are preparing to be the best do not look the best. In Class 112, Cows and Three-year-old Heifers, Mr. Tyssen-Amherst's "Emblem," Second last year at Nottingham, was promoted to the First place, and Mr. Colman's "Midsummer Rose" and "Midget," last year both First winners in different Classes, were placed Second and Third. By study of the awards, the lines on which the Judges had gone might be traced. They had evidently, while attending to that which is technically termed "quality," taken an ideal type, and that rather a dairy type than a beef type, as their standard; although, in a breed so highly praised for its dairy properties as the Red Polled breed, better dairy cows than many of those shown at Windsor might have been expected. Taking the general beef standard—that is to say, the ideal of structure and muscular development and distribution, apart from the distinctive type of any particular breed—as our guide, we should have to admit that there was (generally, in the Red Polled Classes at Windsor) a deficiency—a depression—along the upper forward part of the side, from a little below the top of the shoulder, and immediately behind the shoulder-blade, backward towards the middle of the ribs. This was noticeable in the First Prize cow, a cow of more remarkable character than, for example, Mr. Taylor's "Coercion," standing next to her with a highly commendatory card over her head. A jury of butchers could have pointed to better "cuts," at more

per pound weight, in "Coercion" than in "Emblem," but if the latter cow more truly realised the recognised type of the breed, she was the better cow in that Class, whatever she might be elsewhere. Mr. Herbert Hammond's "Davy 65th," rather long in frame, and of more than the average size of the breed; Mr. Colman's "Rosalie," and Mr. Gooderham's "Wild Ruth," with her bright outlook, were all good, useful-looking stock cows. Mr. Tyssen-Amherst's "Poppety 2nd," only Third last year in a Class of eight yearlings, this year headed a Class of thirteen two-year-old heifers, all entries counted, and only one was absent. She is a daughter of his "Didlington Davyson 2nd," his First Prize bull at Norwich and Nottingham. The same breeder's "Dainty" made a good Second, and his "Emerald," daughter of "Emblem," a good Second also in the Yearling Class, in which Mr. Colman's "Siren," one of "Iago's" stock, was First winner, and "Melton Beauty" and "Convolvulus" very creditably represented the herd of Lord Hastings.

Report of the Judges of Red Polled Cattle.

[Classes 109 to 114.]

The Red Polls showed in considerable numbers, and in some of the Classes there were several very meritorious animals. In Class 109, *Bulls calved* in 1883, 1884, 1885, or 1886, the FIRST PRIZE was awarded to No. 1564 (Mr. H. P. Green's *Wild Roy*), which also obtained the CHAMPION and GOLD MEDAL, an animal of great substance and excellent quality. The other animals in this Class were of sufficient excellence to warrant us in commending the whole of them. The younger bulls in both Classes require no special remarks. The Cow Class contained some of the best animals which came under our notice, and we were much pleased with the milking qualities presented by many of them, and we would respectfully draw the attention of the breeders of this class of cattle to the importance of retaining this characteristic for which it has been so long remarkable. The FIRST PRIZE cow, No. 1595 (Mr. Tyssen-Amherst's *Emblem*), was a close competitor for the Gold Medal. The *Heifer* Classes, particularly those calved in 1887, contained some exceedingly good animals. Good as were two or three of the bulls, the female Classes were, as a whole, much more meritorious.

CHARLES HOWARD.
J. STURLEY NUNN.

SCOTCH BREEDS.

Scotland is said to have three "native" breeds of cattle—the Highland, the Galloway, and the Aberdeen-Angus—all beef breeds, and one breed, not called "native," yet regarded as not less Scotch than the "native" breeds themselves, the Ayrshire dairy breed. Local sub-varieties of the three former breeds, and crosses or nondescript mixtures of the various main types, may be found; but under these four heads the recognised breeds of Scotland are classed. To the first, and particularly to the Highland

stock of Argyleshire and the Western islands, belongs the reputation of being the representative of the primitive breed of North Britain.

The origin of the two polled breeds, the Galloway and Aberdeen-Angus, is very obscure. Whether a sport, one sport or more than one sport, from the horned original to the poll, occurred in Scotland, or whether the polled cattle of Scotland were disinherited of the horn through variation which originated elsewhere, we have no record: neither have we any certain evidence of the prior antiquity of the hornless character in the north-east or in the south-west of Scotland. Although a very marked contrast is seen when the Highland and Aberdeen-Angus types are placed side by side, the difference may be graduated by placing between them a specimen of the Galloway type, which has strong points of resemblance to both the other types. The notice of this graduation of typical characteristics by no means forces upon us the conclusion that the Aberdeen-Angus breed is derived from the Highland through the Galloway, but it suggests the possibility that all three breeds are in their Scottish origin akin, and that, with or without the help of alien blood, new types have been evolved on Scottish soil in the course of centuries.

The Ayrshire type, by its distinctness, tells its own tale of derivation from a different source.

ABERDEEN-ANGUS CATTLE.

Whether the unalloyed descendants of an ancient race of cattle in Scotland, or the representatives of an ancient race *plus* an occasional cross—how and when they lost the horn and developed the characteristic crown—these and other historical speculations may pass. At best, the various suggestions hitherto put forward are but guesses, still unconfirmed, still uncontradicted. That a breed of cattle may have existed in almost primeval purity in the Scottish fastnesses is an assumption which we cannot deny. On the other hand, that Scottish cattle-lifters did come over the border, not once nor twice, but frequently during several centuries, and that English herds were driven before them—somewhere into Scotland, but how far into Scotland we cannot tell—is more than an assumption. Whether the English cattle were all eaten in the festivities after a successful raid, or whether they were distributed about Scotland, and eventually absorbed into the “native” breeds, history does not say. Whatever its source or sources, the Aberdeen-Angus breed of to-day is one of the first beef breeds in the world, and has a very considerable part in the meat production, not only of its own country, but of other lands,

and notably of late years upon the American continent. It has, pure and by its crosses, repeatedly won the Championship of the Smithfield Club, and in international competition it has taken the highest honours, notably the two Champion Prizes of 100*l.* each at Paris, in 1878, for the best group of cattle foreign to France, and for the best group of beef cattle in the Show, both awarded to Mr. M'Combie's group by large juries of mixed nationalities.

At the English national and international Shows the breed has competed very creditably indeed in the miscellaneous Classes and in special Classes. The first of the Royal Shows at which special Classes for Scotch Polled cattle were introduced was the Windsor Show of 1851. The specification was wide enough to admit the Galloways, but the Aberdeen-Angus cattle carried all before them, Mr. M'Combie's winning three out of the four prizes awarded. The First was for a bull bred by Mr. Hugh Watson, of whom Mr. M'Combie himself wrote (*Cattle and Cattle Breeders*, Blackwoods, 1867), in his list of distinguished breeders, "Among these the late Hugh Watson, Keillor, deserves to be put in the front rank. No breeder of the Polled Aberdeen and Angus will grudge that well-merited honour to his memory. We all look up to him as the first great improver, and no one will question his title to this distinction. There is no herd in the country which is not indebted to the Keillor blood." Mr. M'Combie's other winners at Windsor in that year were two heifers bred by himself; and the prize for the best cow also was adjudged to one bred at Tillyfour, but exhibited by Mr. Robert Scott of Balwyllo, Montrose. Such were the results of the first recognition of Scotch Polled breeds in the Society's prize-list.

The next place where those breeds had special Classes was at Carlisle, in 1855, when the specification was altered to "Angus and other Polled," and the results were, in each Class: Mr. M'Combie first, the rest nowhere. The First Prize bull was "Hanton," bred by Mr. Alexander Bowie, of Mains of Kelly. "To him," wrote Mr. M'Combie, "I am indebted for 'Hanton,' who, with 'Angus' and 'Panmure' in the male line, were my 'herd's fortunes.'"

Seven years passed before the Classes were again included, and the occasion was that of the Battersea International Meeting in 1862, when the Highland and Agricultural Society of Scotland, suspending their own annual meeting, gave the prizes for the four Scotch breeds. Those for the breed now engaging our attention were offered under the specification "Polled Aberdeen and Angus," in six Classes—three Classes of males and three of females. The bulls on the whole

made a good show, but the greater part of the strength of the breed was in the female Classes. Mr. M'Combie's First Prize cow, "Pride of Aberdeen," was one of the wonders of the Show, with a remarkable family-history. She was fourth in descent from "Black Meg," the foundress of a very celebrated tribe, comprising many of the most distinguished winners. One of "Meg's" daughters was "Queen of Ardovie," whose daughter, "Queen Mother," purchased by Mr. M'Combie at Mr. Fullerton's sale about forty-five years ago for the sum of 12*l.* 10*s.*, was a prize-winner up to the age of fourteen years. She, in turn, became the dam of "Lola Montes," a well-known Royal Northern winner, and "Lola Montes" gave birth to "Charlotte," a Paris prize-winner, 1856, dam of "Pride of Aberdeen," more than once first at the Highland Society's Shows. At Battersea, "Charlotte" and "Pride of Aberdeen," mother and daughter, were rivals in the ring, and bore away the leading honours, the daughter first, the dam second in the same Class. In the Class of two-year-old bulls Mr. Farquharson's "Garibaldi," bred by Mr. M'Combie from "Pride of Aberdeen," and in the Yearling Class a full brother, "Rifleman," exhibited by Mr. M'Combie, were respectively second and first. Mr. M'Combie's entries gained other prizes, and one prize went to an Irish breeder of Scotch Polls. Three Highland premier bulls competed, and in the prize-list Mr. Lyall's "Prospero" and "Tom Pipes" were separated by "Druid," bred and exhibited by the Earl of Southesk.

In special Classes at Newcastle, 1864, for "Scotch Polls, except Galloways," "Charlotte," in her fourteenth year, and the mother of nearly as many calves as she was years old, again stood beside "Pride of Aberdeen" in the judging-ring, and again won Second to her daughter's First Prize. The daughter inherited her mother's extraordinary fecundity.

Five years later, there were Classes at Manchester; ten years later still, at the Kilburn International Show; in 1880 at Carlisle, and 1883 York, all for "Angus or Aberdeen" cattle; in 1885, at Preston, for "Aberdeen or Angus" (the name reversed), and in 1887, at Newcastle, "Aberdeen-Angus" cattle, a name which was then for the first time, and is this year again, used by the Society.

We have thus traced when and where special Classes were given, and the various names by which the breed at different periods of its history has been recognised by the Society. In many of the years when there were no special Classes for this breed, good and sometimes famous animals won in the mixed Classes; and sometimes, even in early years, prizes were won by specimens in the hands of English exhibitors

Two remarkable drawbacks, which the breed has victoriously passed, have occurred in the course of its history. The Herd-book was contemplated, and the collection of materials commenced, about the year 1842; but, like the Shorthorn Herd-book a generation earlier, the Herd-book of Scotch Polled cattle had a prolonged incubation. At length the collected materials "saw the light," but too literally, for they all perished in the flames of the Highland Society's Museum in 1851.

Six years later, on the initiative of the Earl of Southesk, joined by other leading breeders, Mr. Edward Ravenscroft began the work afresh, and in 1862 issued that volume which has been the subject of much unfavourable comment. The difficulty of his task and its discouraging antecedents must be fairly taken into account; and when the value of a beginning, even if it be not the best possible beginning, is considered, a debt of gratitude to the first editor will be owned by all interested in the progress of Aberdeen-Angus cattle. The copyright of the work was transferred to Mr. Alexander Ramsay, of Banff, and in 1871, when a meeting of breeders decided to proceed with its issue, he and Mr. H. D. Adamson, of Balquharn, agreed to carry it on. Ably edited volumes were from that time issued, a few of the earlier containing the pedigrees of Galloway cattle; but the Galloway breeders formed a Society and took over the Galloway portion of the work, the Aberdeen-Angus breeders forming a separate Society under the Queen's patronage in 1879, acquiring the copyright of the Herd-book and appointing Mr. Ramsay as their secretary. Messrs. James Macdonald and James Sinclair, in their standard *History of Polled Aberdeen or Angus Cattle*, record the circumstances and particulars more minutely than it is possible to give them here.

The second drawback was of a graver nature—the rinderpest in 1865, whereby many fine herds were ruined and many more greatly reduced. The complete recovery of the Aberdeen-Anguses from the verge of extermination—for it amounted to that in a great part of the area which may be called, in the chronicles of the breed, classic ground—was marvellous. The restoration, accomplished quietly, steadily, yet within a wonderfully short time, with characteristic Scottish thoroughness, reflects the greatest credit upon the breeders.

A passing allusion to the subsequent extension of the breed, at home and abroad, to its sudden enormously great rise in selling value a few years ago, chiefly in consequence of the competition of American buyers, and to its progressive excellence at the English Shows of the last five-and-twenty years, will indicate the details, too lengthy for this report, wanted to fill in the out-

lines of a brief historical sketch. We have already seen how grand a breed it had become before the outbreak of rinderpest. The Classes at Windsor this year illustrate the completeness of its restoration.

Class 115, Bulls of 1883-4-5-6, contained twelve entries; Class 116, Bulls of 1887—five entries; Class 117, Bulls of 1888—sixteen entries; Class 118, Cows or Heifers calved before or in 1886—twenty entries; Class 119, Heifers of 1887—nineteen entries; Class 120, Heifers of 1888—fourteen entries. These Classes gave a total of eighty-six entries. The general merit of the cattle was unquestionably of a very high order, and the lessons of the classes indicated the habit of gradual improvement up to maturity, and the prolonged youthfulness, of this breed. Of few other heavy breeds can it be said that the evenness of youth is preserved to advanced age, or that the old cows look so young as the Aberdeen-Angus cows. The back seldom “breaks up,” in the best specimens, until they are past the age when most cattle have ceased to be. If some of these animals, as they advance in years, show a tendency to enlargement of paunch, like aged cattle of most breeds, when roots or other succulent food form any considerable part of their diet, the disfiguring effect is lessened by the almost cylindrical evenness along the top remain unbroken.

The Guisachan herd (Lord Tweedmouth's) was represented in each Class except that of yearling heifers, and won honours in each. In the First Class of bulls, the First Prize, the Champion Prize for male animals, and the Queen's Gold Medal for the best of the breed, male or female, in any Class, were awarded to the large, massive, noble-looking bull, “Cash.” Strikingly grand in his fore-quarters, with a straight top-line, thick-fleshed back and heavy thighs—good, indeed, from end to end, “Cash” is a bull to be remembered and mentioned in after years, although the breed which produced him can doubtless produce many more as good as he. The writer has a better opinion of the Aberdeen-Anguses than to suppose for one moment that Lord Tweedmouth's splendid bull, or any other single poll, dead or living, may be truly described as peerless. “Cash” is a son of “Moss Trooper,” a remarkably impressive sire, whose sons, “Field Marshal of Guisachan” and “Free Lance of Guisachan,” and daughters, “Pride of Guisachan 20th” and “Fame of Guisachan,” shared with “Cash” the high opinion of the Judges. “Field Marshal,” a full brother to “Cash,” was first in the two-year-old Class. Both are from “Frailty,” a daughter of “Judge,” one of Mr. M'Combie's group of winners of the double championship at Paris in 1878.

The Second Prize aged bull, "Esquire," exhibited by Mr. Andrew Mackenzie, was bred at Ballindalloch Castle, and is a son of Sir George Macpherson Grant's "Iliad," from "Elba," a daughter of the Kilburn champion bull "Young Viscount," whose name in the history of the breed seems likely to be a prominent one for years to come. "Esquire" is a bull of the sort that often does a great deal of good where bulls of more imposing presence fail to do so much. He is short-legged and thick—American critics might say "smooth," a term which in their phraseology does not mean sleek-coated, but free from hills and valleys on the surface. He is a bigger bull than he looks. Another son of "Moss Trooper," and on the dam's side also closely related to the champion bull, was the Dowager Countess of Seafield's "Epigram," a bull of good form with admirable back, ribs, and quarters, winner of the Third Prize in the Class. Sir G. Macpherson Grant's "Plutarch," another of "Iliad's" stock, had the Reserve Number. Mr. Alexander Strachan exhibited "Champagne," a really good son of "Moss Trooper," bred at Guisachan, and Major Dent sent his handsome Ballindalloch bull "Janus."

First in her Class, champion female, and Reserve for the Queen's Gold Medal, was Mr. George Wilken's "Waterside Matilda 2nd," bred by Mr. Law. She had been carrying all before her in Scotland, yet had nothing like a walk-over at Windsor, for the competition appeared to be very strong, and the number of first-rate cows brought before the Judges made the issue seem to outsiders very doubtful. The Royal herd at Abergeldie Mains was represented. There were the Marquis of Huntly's "St. Anna" (a perfect picture of the ideal highly-bred polled cow), whose daughter "St Agnes" was first in the Two-year-old Class; Lord Tweedmouth's "Pride of Guisachan 20th," a lineal descendant of "Pride of Aberdeen"; Mr. Clement Stephenson's "Abbess Royal," half sister to his "Albion," the First Prize yearling bull; and there were Sir G. Macpherson Grant's "Elegy," Mr. Wallis's "Althea," Miss Morison Duncan's "Melissa Grace," Mr. Owen's "Princess Matilda," Mr. Farquharson's "Sally of Haughton," and other good animals, which made a dazzling display, delightful in the variety of individualities within one distinctive type. The Judges picked out "Elegy" and "Matilda 2nd" (their choice was generally approved), and eventually awarded to the latter the honours already mentioned. If the Waterside cow had not been just a trifle past her best condition for show, it is questionable whether the final contest for the Queen's Gold Medal should not have ended differently, although, in judging

cattle where merit is about evenly balanced between male and female, most Judges give the preference to the bull as the probable parent of 20 or 30 calves for every one the cow can produce.

Both the Two-year-old and Yearling Heifer Classes were strong in the good qualities as well as in the numbers of the animals shown. The awards, however, will be found in the usual place; and for further description of the Classes and animals the reader has the annexed report of the most competent witnesses.

Report of the Judges of Aberdeen-Angus Cattle.

[Classes 115 to 120.]

There has seldom been a better turn-out of this breed than there is on the present occasion, the Aged Class of *Bulls* and the Class of *Cows* being really excellent, and certainly a credit to any showyard.

CLASS 115. *Aged Bulls*.—The FIRST PRIZE was awarded to an exceptionally good animal, No. 1628 (Lord Tweedmouth's *Cash*). He combines great length and style with particularly even flesh, and is extraordinarily good in his roasts, rumps, and loins. There have been very few better bulls of this breed turned out in recent years. He was an easy FIRST here in his Class, and also had no difficulty in carrying off the CHAMPION PRIZE as best animal of the breed. The SECOND PRIZE, No. 1626 (Mr. Andrew Mackenzie's *Esquire*), was awarded to a very nice, gay, sweet, bull, showing great quality and fine breeding, but perhaps a little undersized. There are not many of his age, however, which would compare with him, and he would make a creditable first in very good company. The THIRD PRIZE bull, No. 1630 (the Dowager Countess of Seafield's *Epigram*), is only a few days too old to compete in the Two-year-old Class. He is a promising outcoming bull that will yet be very difficult to beat. The RESERVE NUMBER and HIGHLY COMMENDED bull (Sir G. Macpherson Grant's *Plutarch*) shows great quality, but is a little narrow behind, and rather small for his age. The COMMENDED bull has great substance, but is rather coarse in his bone.

CLASS 116—*Two-year-old Bulls* were only fair as a Class. The FIRST PRIZE bull, No. 1640 (Lord Tweedmouth's *Field Marshal of Guisachan*), competes at a slight disadvantage, being only a few hours too old to compete in the younger Class. He has great style and character, with fine hind quarters, but shows a little weakness behind the shoulders when standing. The SECOND PRIZE, No. 1637 (Mr. John McIntyre's *Knight Errant*), is a strong good bull, not so level as might be desired, nor so good in his underline. The THIRD PRIZE, No. 1639 (Mr. Andrew Mackenzie's *Lord Ivory*), is a thick useful bull, but rather short.

CLASS 117.—*One-year-old Bulls* were a very good Class. The two first were of a slightly different type from those following. The FIRST, No. 1646 (Mr. Clement Stephenson's *Albion*), is a bull of great substance, and particularly well brought out; he is very good over his loins, but not quite so level at the tail-head as he might be. The SECOND, No. 1655 (Mr. J. Douglas Fletcher's *Prince of Euston*), is also very strong for his age, and has good quality. The THIRD, No. 1647 (the Dowager Countess of Seafield's *Midnight Cullen*), is perhaps as sweet and level as any in the Class, but is a trifle bare on his back, while the Reserve is a very straight young bull, but rather leaner in condition than some of the others. The Highly Commended and Commended bulls are both very promising, and may be hard on those in front of them by another year.

CLASS 118—*Cows or Heifers in Milk or in Calf*—was one of the Classes of the Show. It contained some very fine specimens of the breed. There was a pretty close pull for first honours between two very fine animals which stood distinctly ahead of the others in their Class. The FIRST PRIZE, No. 1664 (Mr. George Wilken's *Waterside Matilda 2nd*), was given to an eight-year-old cow of extraordinary wealth of flesh. She is perhaps losing a little of her bloom, but is really an extra fine animal. The SECOND, No. 1676 (Sir G. Macpherson Grant's *Elegy*), is a beautifully straight, level cow, showing a great deal of breeding and feminine character, and would make a creditable first in almost any competition. The THIRD, No. 1668 (the Marquis of Huntly's *St. Anna*), is also an uncommonly sweet cow, rather undersized, but showing as much quality as any in the Class. The Reserve is a strong, straight young cow of good quality, but standing a little high on her legs. The cow following is also very good with finely-covered top, and the others ticketed are also very good specimens, some of them following very close on the others placed before them.

CLASS 119. *Heifers calved in 1887*.—In this Class there were some very good animals. There was no difficulty in awarding the FIRST PRIZE to No. 1689 (the Marquis of Huntley's *St. Agnes*), a very thick well-brought-out heifer of good quality, but a little short in the neck. The SECOND, No. 1683 (Lord Tweedmouth's *Fame of Guisachan*), is a stylish young heifer, shown to a disadvantage alongside the others owing to her age. She has every appearance of turning out well. The THIRD, No. 1693 (Mr. G. S. Grant's *Duchess S.*), is a fine-topped, level heifer, showing a deal of breeding. The RESERVE NUMBER, No. 1692 (Mr. G. S. Grant's *Livonia*), is a thick compact heifer. The others mentioned in the Class are also all very good.

CLASS 120—*Heifers calved in 1888*—were a fine Class. The FIRST PRIZE, No. 1698 (Mr. Andrew Mackenzie's *Lady Ida 5th*), is a beautiful heifer, well brought out, and showing great quality and breeding. She is a very promising youngster. The SECOND PRIZE, No. 1706 (Mr. A. Egginton's *Miss Maurice of South Ella*), is also a very good, straight, even-topped heifer, not shown in extra condition; while the THIRD PRIZE, No. 1707 (Mr. Owen C. Wallis's *Hoiden*), is very strong for her age, with plenty of good flesh and well brought out. The RESERVE NUMBER, No. 1704 (Mr. Clement Stephenson's *Reticence*), is also a big, strong useful heifer. The two heifers following are both young, but show great quality and breeding combined with fine style.

C. J. BRUCE.

WM. ROBERTSON.

GALLOWAY CATTLE.

From whatsoever sources derived, by whatsoever processes of evolution brought to its present distinctness of character, the hornless breed of Galloway is now potentially "pure,"—that is to say, and it is as much as we can say truly for the so-called "purity" of any improved breed, it is constant to type within itself. But it is more than that. It has extraordinary power of stamping its likeness upon its cross-bred offshoots. For practical purposes, knowing this, we need not trouble ourselves to ascertain precisely the elements of which it is composed, nor how long they have been blended. The pedigrees of Galloway cattle were first publicly recorded in the *Polled Herd-book* edited by Mr.

Ravenscroft, and continued in a few subsequent volumes of the work conducted by Messrs. Ramsay and Adamson; but after the fourth volume, the Galloway Cattle Society obtained the copyright of the Galloway portion of the Herd-book, which has since formed a separate work, edited by the Rev. John Gillespie.

The main points of connection between its history and the Shows of the Royal Agricultural Society of England may be told very briefly. In the miscellaneous Classes, and in the Classes for Scotch Polled cattle, they had to compete with heavier stock, and size, merit being equal, usually wins. The breeders did not exhibit very hopefully, nor, therefore, so often as they might have done under stronger inducements. The breed, however, has its special recommendations, and in some districts for which larger breeds would be unsuitable, and in districts where a "dreadnought" great-coat is necessary to existence, it is the breed that exactly meets all wants. When special Classes have been granted, excluding the Aberdeen-Angus, the Galloway has sometimes shown its strength. At the Battersea International Show, 1862, separate Classes were provided, but the distance was very great for a local breed, and two of the Classes of bulls were failures, the Second Class having no entries and the Third Class only two. The merit of the older bulls, however, went far to compensate for those deficiencies. The cows and heifers, although their Classes filled and contained some good animals, were not quite equal in merit to animals since exhibited in corresponding Classes. At Manchester, 1869, the competition for the Local Committee's prizes was not great, but the breed was fairly represented. When the Society's Shows were held at Hull, 1873, and Liverpool, 1877, the Galloway breed had special Classes, no Classes on either of those occasions being granted to the Aberdeen-Angus cattle; but Galloway breeders in Scotland scarcely did what was expected of them, and, with the exception of the Duke of Buccleuch's entries at Hull and Mr. Cunningham's at Liverpool, all the winners belonged to Cumberland men, Mr. J. Graham of Parcelstown scoring well at both Shows.

At the Kilburn Show only eleven animals were entered, but they were exceedingly good, and each animal exhibited received a card. Cumberland, again, where the breed has been long established, took most of the honours. In the Two-year-old Heifer Class, two exhibited by the Prince of Wales, but bred in that county by Mr. Murray of Close Gill, had the First Prize and Reserve Number respectively, Mr. James Graham's two coming in as Second and Third between those of His Royal Highness, and Messrs. J. and T. Graham and J. Little, all Cumberland men, took the rest of the prizes, excepting

two Seconds and one Third won by Mr. J. Cunningham's entries. The Galloways have since had special Classes at Carlisle, York, Preston, and Newcastle. At Carlisle, 1880, there was a strong Show; forty-nine entries, with merit in proportion to numerical strength, indicating the progress of the breed since the Society had visited that city just a quarter of a century before, when the prizes were for "Angus and other Polled," and the "Other" failed to assert themselves. York, 1883, had a tolerably good show of Galloways in number, and not a bad average of merit; a few of the animals superlatively good, the rest moderate: Preston, 1885, twenty-six entries, some of the pick of the breed exhibited; and Newcastle, two years ago, sixty-five entries, a magnificent Show.

This year's Show at Windsor did not equal, by a considerable distance, the Newcastle Show, yet came within two or three entries of the number entered for Carlisle, in the very heart of the breeding district, and between the homes of English and Scotch exhibitors, only nine years ago, whilst the merit of the cattle at Windsor was great, especially in the female Classes. The numbers were: Class 121, Bulls of 1883-4-5-6, seven entries; Bulls of 1887, six; Bulls of 1888, four; Cows or heifers calved before or in 1886, eight (one withdrawn); two-year-old Heifers, seven; and yearling Heifers, fifteen entries. The First Class of bulls contained the male champion, "Vale Royal of Closeburn," a showy bull of much length and substance, evenly fleshed and remarkably good in the fore-end, bred and shown by Mr. F. E. Villiers; Sir Robert Jardine's "Liberator of Balig," the Newcastle champion bull, bred by Messrs. Shinnan, was placed Second; and in the Third place was Mr. Cunningham's "Lucky Times," a bull with plenty of chest for the vital organs to work in. "Vich-Ian-Vohr," bred by Mr. Villiers, and own brother to his "Vale Royal," the champion bull, and "The Squire of Drumlanrig," the latter, of course, bred, and both exhibited, by the Duke of Buccleuch, had both also cards of honour. Bulls of 1887 were unequally matched in age, the Second winner having given his rivals a good half-year's start, but the competing animals were of creditable merit. Sir Robert Jardine's yearling bull, three other bulls entered being absent, had the First Prize unopposed. Frequenters of the English Shows will remember his dam as the Preston Royal First Prize cow, and those who annually attend the Highland Society's meetings will associate her with centenary champion honours. The Cow and Two-year-old Heifer Classes were both good, the former containing the Galloway of the year, Mr. James Cunningham's beautiful "Maggie of Tarbreoch," with Sir Robert Jardine's wonderful mass of beef in the Second place, and the pretty little "Villa of Closeburn"

Third; the Heifer Class having as Third a Closeburn heifer of much the same character, with a couple of choice Drumlanrig heifers in the higher places, and another Tarbreoch as Reserve. Closeburn came out again a good First in the Yearling Class with a daughter of the champion bull.

Report of the Judges of Galloway Cattle.

[Classes 121 to 126.]

The Galloways were fairly numerous, and in most of the Classes the merit was high. On the whole they were a creditable representation of the breed. The *Aged Bulls* constituted a good Class. The **FIRST PRIZE**, No. 1711 (Mr. F. E. Villiers's *Vale Royal of Closeburn*), is a massive, level, symmetrical animal, whose head, however, is not perfect. We awarded him the Cup as best male. The **SECOND PRIZE** bull, No. 1712 (Sir R. Jardine's *Liberator of Bal.*), has specially good back and loins, but shows a tendency to patchiness. The other animals placed were possessed of excellent Galloway character.

The *Two-year-old Bulls* were a level lot. The **FIRST PRIZE** one, No. 1717 (Mr. J. J. Paterson's *Macleod 3rd of Balgray*), is very superior in every respect, except that his bone is a trifle too strong. The **SECOND PRIZE** animal, No. 1722 (Mr. James Cunningham's *Macdougall of Tarbreoch*), was at a disadvantage from being younger than his rivals, but he possesses great sweetness and quality. Several other capital specimens of the breed were placed. There was only one yearling bull, No. 1723 (Sir R. Jardine's *Nestor of Castlemilk*), forward, but he is level, gay, and symmetrical. He appeared exceptionally full of promise, but we regret to learn he has since died from the effects of a chill caught at the Show.

The *Cows* formed an excellent Class. The cow placed **FIRST** in her Class, No. 1732 (Mr. J. Cunningham's *Maggie of Tarbreoch*), was also awarded the Cup, as best female, and Her Majesty's **GOLD MEDAL**, as the most meritorious animal of either sex. She possesses great symmetry and true Galloway character. The **SECOND PRIZE** cow, No. 1729 (Sir R. Jardine's *Lady Isabella Douglas of Nether Hall*), has unusually great substance, and she is also good otherwise, but she is deficient in feminine character, having a steer-like appearance. Several other capital cows had tickets awarded to them.

The *Two-year-old Heifer* Class was a very superior one. The heifer placed **FIRST**, No. 1739 (the Duke of Buccleuch's *Pride 4th of Drumlanrig*), combines substance and quality in an exceptional degree, her main defect being a slight slackness behind the shoulder. The others placed were good, but were not extra strong in any special feature.

The large entry of *Yearling Heifers* comprised a large proportion of animals that are full of promise.

M. CLARK.

THOS. GIBBONS.

HIGHLAND CATTLE.

It was said of a famous prize bull (no matter of what breed), when a Judge who had seen him was asked to describe his points, "He had none." His symmetry was so nearly perfect, the parts were all in such true proportion to one another, that it was impossible to say where he excelled. It is difficult, if not equally

impossible, to touch salient points in the history of the Scotch Highland cattle. Youatt wrote, somewhere about half a century ago, that to the cattle of the Western islands "the honour of being, or at least of retaining the character of, the primitive breed is now generally yielded," and, still referring to the Hebrides, he added that from those islands "are procured the purest and the best specimens selected to preserve or to improve the Highland cattle in other districts." If the breed could tell its own history, it would be, we may presume, in effect, although no doubt in the Gaelic tongue, *j'y suis, j'y reste*. Long may that be its motto! To destroy that ancient type, to lose or to pollute that source of pure and healthy blood, would be truly to waste that which we never could restore.

The Royal Agricultural Society of England offered prizes for Scotch horned cattle at Windsor, in 1851, but Ayrshires won them. Four years later, at Carlisle, "Highland and other Horned Breeds" were separated from the Ayrshire cattle, and the prizes were awarded to a Poltalloch bull and cow, the heifer Class being empty. In the general competition of unspecified breeds at Chester, in 1858, Lady Pigot's West-Highland bull was at the head of his Class. The Battersea International Show of 1862 was, as regards Scotch breeds, the Highland Society's Show of the year, and, notwithstanding the distance from Scotland, there was a really fine Class of old bulls, Mr. Malcolm's brindled "Duntroon," bred by the Marquis of Breadalbane, being a strikingly grand specimen of the Highland breed and type, of which the female form was as beautifully illustrated in the Marquis of Breadalbane's three-year-old heifer "Prosaig." The breed has been since represented in special Classes at Newcastle, 1864, at the Kilburn International Show, 1879, and at Newcastle, 1887, but at none of those Shows were the entries numerous.

The entries this year, in the two Classes at Windsor, seven bulls of any age, and eleven cows and heifers of any age, were fairly numerous considering the distance from home, and were of very good quality. The red and yellow colours greatly prevailed over the black, only three of the eighteen entries being black, and only one of those belonging to a Scotch exhibitor and from the herd of a known breeder; nine were red, five yellow, and one was dun, all from well-known Scotch breeders. This looks as if the great charm (as in the Highland breed it is) of variety of colour is not to be lost in favour of a fashion for one colour. The Duke of Sutherland's red Newcastle First Prize cow was again at the head of her Class and took the Queen's Gold Medal, and a two-year-old bull from the same herd was first

among the males, being placed over at least one veteran prize-winner. The Judges supply ample descriptive particulars.

Report of the Judges of Highland Cattle.

[Classes 127 and 128.]

There were a few very good animals of this breed forward. In CLASS 127—*Bulls of any age*—the FIRST PRIZE, No. 1763 (the Duke of Sutherland's *Lord of the Isles*), was without difficulty awarded to a very promising young bull, showing true Highland character, with fine hair and horns, and very nicely set on his legs; the SECOND PRIZE, No. 1757 (Mr. Henry C. Stephens' *Calum Odhar of Athole*), was given to a strong lengthy dun bull; the THIRD PRIZE, No. 1762 (the Duke of Sutherland's *Clebrig*), to a very nice young bull, rather more black in colour than he should be, but otherwise showing true points for a Highlander.

CLASS 128—*Cows or Heifers of any age*—was a very good class. The winner of the FIRST PRIZE, No. 1774 (the Duke of Sutherland's *Tarrgheal of Sutherland*), is a good deal ahead of the others, and is possibly the best cow of the breed to be found anywhere; she is very gay when walked out, and has very fine character, her shape, hair, and horns being almost perfect for a Highland cow; she was awarded the CHAMPION PRIZE as best Highlander. The SECOND PRIZE, No. 1770 (Mr. T. V. Smith's *Proisag Dhubh*), is given to a big stylish twelve-year-old black, of great character, but now losing bloom a little. The THIRD PRIZE, No. 1771 (Mr. T. V. Smith's *Phroiseag 7th of Benmore*), was given to a very stylish heifer six years old. The Reserve and the Highly Commended and Commended animals were all very good.

C. J. BRUCE.

WM. ROBERTSON.

AYRSHIRE CATTLE.

In the absence of evidence of the sources of the modern Ayrshire breed, fragments of fact and tradition which serve to suggest hypotheses, but do not afford sound foundation for positive opinion, are scarcely worth inserting here. They may be matter for interesting discussion where such discussion is convenient. We have it in evidence, however, that the breed rose originally in the Bailiary or district of Cunningham, the northern division of Ayrshire, and that its nursery was the parish of Dunlop, where, according to Colonel Fullarton, whose "General View of the Agriculture of Ayrshire" was written in 1793, it had then existed about 100 years. Black and brown were the prevailing colours, with white markings, those on the face and white streaks along the back being particularly mentioned, but in the last quarter of the last century the fashion changed in favour of brown and white cattle, and the breed altered, as breeds do alter, to suit the fashion. Cunningham, we are told, has been a dairy district from time immemorial. What more likely than that good dairy cattle should be drawn to that district, where they were wanted, from districts in which

dairy properties were of less value, and that intermixing, and the offspring being always selected and reared for the dairy, their descendants formed a distinct breed, modified, further, in regard to colour, when the brown and white gained preference? Breeds do not, in the first instance, drop down into a district ready cut out and coloured to order. The various component elements gravitate, or percolate—to vary the figure—towards the centre where there is a demand for them—a demand without concert, created by the wants of men individually. Selection is regulated by demand, not often with the object of raising a new breed, although the rise of a new breed, eventually, is the result; and the improvement and development of the breed, when established, are then designedly effected by a few leading men.

The Ayrshire gradually attracted notice outside its native district, having proved itself a dairy breed of the first class of merit, not large, but of size most suitable for districts which cannot maintain large-framed cattle, and yielding an immense return in proportion to food consumed, besides being constitutionally habituated to a moist climate, and in type so fixed (with permissible variations of colour and the distribution of colour) that an Ayrshire cow's breed would be known if only her milk-vessel were seen. Not only single specimens, but breeding herds, have been long spread over the United Kingdom and foreign countries, in some cases under Government ownership for the benefit of the provinces, as in Sweden. Systematic improvement has now gone on for nearly 100 years.

In June, 1877, a number of breeders formed the Ayrshire Cattle Herd-book Society of Great Britain and Ireland, which had not been in existence many months when the first volume of the Herd-book was issued, in the beginning of 1878. Ever since, volume has followed volume as regularly as year followed year, and always in the beginning of the year, so that there are now twelve volumes, the entries in which number 6,100 cows and 1,831 bulls. The twelfth volume contains the names of 123 breeders; so the Ayrshires may be considered as fairly on their legs and ready to go anywhere, taking with them duly authenticated records of pure descent. Their dairy records, however, constitute their primary claim to extended patronage. An eminent authority, Mr. William Bartlemore, of Paisley, in a sketch of the history and characteristics of the breed, contributed to the "*Melbourne Leader*" in the autumn of last year, says:—

"A fair average of herds of say 50 cows, not specially selected, runs from 630 to 660 gallons per annum. In any view, one is quite justified in saying that an Ayrshire cow ought to yield over 620 gallons per annum, showing

12½ per cent. of solids, 12 to 16 per cent. of cream, and 3½ to 4½ per cent. of butter-fat. . . . The average yield [of butter] so far as records go ought to be something about 230 lbs. per annum.'

Mr. Bartlemore gives selected examples very much in excess of these figures, but, again dealing with averages, states that "the quantity of cheese yielded by each animal is over 5 cwt." The globules of butter-fat are of smaller size than in the milk-yield of the Jersey, so that the cream does not rise so quickly, but makes an evenly rich cheese.

Ayrshire Classes were first granted by the Royal Agricultural Society of England at the Carlisle Show of 1855, although at Windsor, 1851, prizes were offered for "Scotch Horned" cattle, and were awarded, in both cow and bull Classes, to Ayrshires. In 1862 the Battersea International Meeting brought some of the best over the Border, including the Duke of Athole's extraordinary dairy cow "Colly Hill" (to see her milked was one of the sights which drew a crowd), and the Duke of Hamilton's noted bull "Sir Colin." From that year the total difference between the Ayrshire and other horned Scotch cattle has been recognised by the Society, and at Newcastle, 1864, there were separate Ayrshire and Scotch Horned Classes; at Kilburn (International), 1879, separate Ayrshire and West Highland Classes; at Newcastle, 1887, separate Classes for the Ayrshire and Highland breeds respectively; and at Manchester, Hull, Liverpool, Carlisle, York and Preston, special Classes for Ayrshires, other horned Scotch cattle being omitted from the prize schedule. It is not, perhaps, necessary to follow here the Ayrshires in competition among "other established breeds," or in the Classes for "dairy cattle" at the Society's Shows.

The exhibition of Ayrshires at Windsor was the best ever seen at a Royal Show. The Scotch breeders had quite entered into the spirit of the Jubilee year, and the extra large sums of money offered in prizes no doubt persuasively supplemented other inducements to send their very best animals so far from home. Several English breeders also exhibited good animals. Before noticing the Classes in detail it may be as well to offer a few general remarks upon them. The increasing prevalence of light colours could scarcely fail to strike any one glancing over the Classes in full recollection of the exhibits for many years past. Whether correlation may be traced between certain colours or certain markings, and the increased production of milk, butter, or cheese, or whether colour is merely a plaything in the hands of breeders, for the gratification of fancy, we need not now inquire too closely. The indulgence of taste in such matters is not to be scorned, so long as it is reasonable and does not run

counter to the laws which must be observed for purposes of practical improvement; but when the practical breeder, by a long series of acts of selection, has moulded the udder to perfect form and marvellous capacity, it does seem too bad that the mere fancier should step in and demand the diminution of the teats. This absurd freak of modern fashion has really done much to handicap the Ayrshire in competition with the Jersey, a breed against which, in the cloudier districts of England, it should be able to dispute the ground in park or paddock. But laborious pinching between forefinger and thumb is not the sort of milking that puts the cow-man in a sweet temper. The cow-man's voice, therefore, and his master's choice, will be against the Ayrshire unless the Ayrshire breeder gives him a chance of a proper grip. In this particular the breed is decidedly recovering from the temporary mischief of an unreasoning fancy.

The form of the Ayrshire is in strictest agreement with the generally recognised ideal of the true dairy type. It is the wedge, thin-end forward, in a certain sense, but this should not be understood to mean tapering to the front so as to allow no play of vital organs. The forelegs, on the contrary, are not close together, nor is the chest too narrow, but granted sufficient space for the mainspring and other principal works of the machine, the power acts in the direction of the udder and its tributaries. In the typical dairy cow—let us call her the Ayrshire—we have no ungainly hollows and slacknesses, no rude unevennesses of outline, but head, neck, breast, and body all cleanly moulded and neat, the forequarters shallow as compared with the perpendicular depth from immediately before the hips, and the top-line straight. The udder has its size in its great length forward under the body and its rise up the twist, and in its true proportion of width to length, and not so much in downward development, which always is, when out of due proportion, an unsightly form never seen in a typical specimen of this breed. These questions have seemed to deserve more than usual consideration here, on account of the greater scope of the Jubilee Show than of ordinary annual exhibitions for illustrating the various modern developments in British breeds of cattle, the representative character of the Ayrshire as a dairy breed, and the great amount of attention bestowed in years past upon the beef points of exhibited animals, whilst we are gradually becoming more and more dependent upon dairy stock for the prosperity of British agricultural interests.

The foregoing general remarks may be illustrated by a few particulars. In the fine Class of cows, which of course afforded the amplest study of the developed properties of a dairy breed, we had the form of udder to which reference has been made.

That vessel, beginning very little behind the umbilical point, goes backward with an almost horizontal outline, only gently swelling downward, without any sudden drop, and rising up behind into the escutcheon or twist. It covers, in fact, great space, and is less distinguishable from the body than the average appendage which does duty as a milk-vessel in other breeds. In some instances the stupid fashion for diminutive nipples had left its impress, but in many instances there was a fair hand-hold for the milkmaid, without unshapely size or coarseness.

Six Classes, three of males and three of females, contained altogether fifty entries: Bulls of 1883-6 numbered seven; two-year-old Bulls, five; yearling Bulls, five, making seventeen bulls; Cows, fourteen; two-year-old Heifers, nine; yearling Heifers, ten, bringing up the number of cows and heifers to thirty-three, or a total of fifty Ayrshires. One of the most remarkable facts of the Show was the prevailing excellence of the descendants of one bull, "Hover-a-Blink," the Society's Premier bull at Preston four years ago, and winner of many prizes and of Champion honours at the leading shows in Scotland as well as in England. He was bred by Mr. Hutcheson, of Stairs, and used and exhibited by Mr. W. Bartlemore, of whose celebrated bull, "Silver King," he was the sire. In the Aged Bull Class at Windsor, all the three Prize-winners were sons of "Hover-a-Blink." One of those bulls, Mr. Osborne's "Cock-a-Bendie," the Champion at Newcastle, again gained the Championship. In the Two-year-old Class, all the three winners and the Reserved Bull were sons of "Cock-a-Bendie," and in the Yearling Class one of his sons had the Second Prize. In the Two-year-old Heifer Class a heifer of extraordinary merit, Mr. Mitchell's "Nellie of Barcheskie," a daughter of "Cock-a-Bendie," was First in her Class and winner of the Champion Prize as best female and the Queen's Gold Medal as best Ayrshire; and a daughter of "Hover-a-Blink," Second and Reserve for Her Majesty's Medal, her full sister taking the First Prize in the Yearling Class. The award of Reserve for the Gold Medal to a Second Prize animal might appear at first sight an anomaly; but if the Judges thought Mr. Stewart's "Betty of Southwick" a better animal than her yearling own sister, than the First Prize cow, and than the Champion bull, they were obviously within their powers in giving effect to that opinion.

Report of the Judges of Ayrshire Cattle.

[Classes 129 to 134.]

CLASS 129—*The Aged Bulls*—were a very good Class. The first three prize animals were as good as ever came under our inspection, even in their native county.

CLASS 130—*The Two-year-old Bulls*—were a fair Class. The FIRST PRIZE bull, No. 1785 (Mr. Robert Montgomerie's *Glencairn*), being considerably better than any of the others.

CLASS 131—*One-year-old Bulls*—were also a good Class, particularly the FIRST, No. 1789 (Mr. Andrew Mitchell's *Craig Isla*), and SECOND, No. 1790 (Mr. R. Osborne's *Cock of the Walk*), PRIZE ones, which were very superior bulls.

CLASS 132—*Cows in Milk or in Calf*—were only a medium Class, the season being too far advanced for milk, cows showing in good bloom.

CLASS 133—*The Two-year-old Heifers*—comprised by far the best Class in the Show, particularly the three prize animals. The FIRST PRIZE heifer, No. 1809 (Mr. Andrew Mitchell's *Nellie of Barcheskie*), which was awarded the QUEEN'S GOLD MEDAL, as the best animal in the Classes, is the best specimen of the breed that has been seen in any Showyard.

CLASS 134—*One-year-old Heifers*—were also a good Class, particularly the FIRST, No. 1818, (Mr. Mark Stewart's *Betty 2nd of Southwick*), and SECOND, No. 1821 (Mr. Robert Osborne's *Nellie*), PRIZE ones, which were very meritorious heifers.

ANDREW ALLAN.

ANDREW MONTGOMERY.

CHANNEL ISLANDS CATTLE.

Under this name the distinct but kindred breeds of Jersey and Guernsey competed indiscriminately when first recognised in the Society's Prize-lists, and for some time afterwards. The first occasion was at Southampton in 1844, when three out of the four prizes awarded went to exhibitors living in the island of Jersey, and one to an English exhibitor for a bull vaguely described as of the Channel Islands breed. The next Show where Classes were introduced was that at Windsor, in 1851, when a Guernsey cow took the one Prize offered for her Class; the breed of the winning bulls was not stated, and two heifers were described as "Alderney," a name, in that day, often applied in error to the Jersey. At Salisbury, 1857, a Guernsey and a "Channel Islands" animal were respectively the winners in Special Classes. The Classes were first separated at the Battersea International Show, 1862, when the prizes were offered respectively for "Jersey, commonly called Alderney," and for "Guernsey" cattle. The old description, "Channel Islands," was adopted at Newcastle, 1864, Plymouth, 1865, Leicester, 1868, Manchester, 1869, and Oxford, 1870, and the animals competed without distinction of breed. Beginning with the Wolverhampton Show, and continuing without break to the present time, the Jerseys have had special and separate Classes; and in all the same years, excepting 1883-4-5, York, Shrewsbury, and Preston, where there were no Classes for Guernsey cattle, the Guernsey breed has been favoured by the Society with separate Classes for animals of both sexes. In the earlier years of the Society both breeds occasionally competed

in the Classes for any breed excepting those breeds which had special Classes.

In this year's Show the Jerseys and Guernseys together numbered 575 entries, out of a total of 1637 of cattle of all breeds, making thirty more than one-third of the whole.

The two breeds, although they may have been occasionally crossed with each other, are bred to two very distinct patterns. The red and yellow colours of the Guernsey, usually with white markings and buff noses (although the black nose is sometimes seen), are but little removed in character from the colours of some of the old Teeswater cattle, the stock from which the modern Shorthorn grew; but the Jersey colours have a strong peculiarity not seen in any other cattle of the British Islands. It is in the way in which one colour grows through another, especially in the so-called whole-colours or colours unbroken by white markings; for example, frosted silver on a black, a dun, or a fawn ground. The effect is caused by silver-white hairs, scattered thinly over the body, outgrowing at certain seasons of the year the closer hair of the ground colour. In the hotter months this finer and longer hair is often cast, leaving the ground colour clear or nearly so. Hence, in descriptions in show catalogues or sale catalogues, when any attempt is made to supply more definite particulars of colour than "whole" or "broken," and another season has followed that in which the notes of colour were taken, the animals do not agree with the descriptions given. The same peculiarity may be observed in at least one of the Swiss breeds, which possibly has some remote ancestral connection with the Jersey.

JERSEY CATTLE.

Very soon after its inauguration, the Royal Agricultural Society of England published a valuable treatise "On the Jersey, misnamed the Alderney Cow," written by Colonel Le Couteur, and contained in the fifth volume of the First Series of the Journal. In the twelfth volume, Part II., an article on the "Breeding Points of Jersey Cattle" contains tables of the scales of points for both sexes as confirmed by the Royal Jersey Agricultural Society, June 30, 1849; and so recently as the year 1881, Vol. XVII. Part I., Second Series, contains an exhaustive paper on "Jersey Cattle and their Management," by Mr. Thornton, the recognised leading English authority upon the subject. In these articles, and in Mr. Thornton's masterly history of the breed given as an introduction to the first volume of the English Herd-book of Jersey cattle, edited by himself, the best and fullest information will be found.

The first public intimation of a desire on the part of English breeders of Jerseys to possess a national Herd-book of the breed occurred on the occasion of Mr. Simpson's sale at Wray Park, Reigate, in the spring of 1878, when the late Lord Chesham, speaking from the chair at the luncheon, proposed that breeders should unite to establish one. This suggestion was further considered at the Royal Agricultural Society's Show at Bristol in the same year, and at a meeting held on the show-ground the preliminaries were arranged. Mr. Thornton was invited to act as honorary treasurer and secretary, and consented to accept those offices in the interest of a committee of Jersey breeders, formed to bring out the Herd-book by private enterprise. The first volume was issued in March 1880, and contained, besides historical matter, the pedigrees of 973 bulls; the second volume, March 1882, contains the pedigrees of 850 cows and their produce, with additional bulls. Supplements were afterwards issued containing birth sheets and accounts of shows and public sales. In July 1883, an incorporated Society named the English Jersey Cattle Society was established, and by that Society the third and fourth volumes have been issued from Mr. Thornton's offices, the secretaryship of the new Society having naturally passed to Mr. Thornton. The fourth volume, dated October 1888, brings up the number of registered bulls to 3009, and the cows and produce to the close of 1887. The list of members contains about 380 names. The Society has annually granted considerable sums of money in medals and money prizes and butter tests, thereby doing much to maintain the efficiency of the breed as dairy stock. Mr. Thornton, in his paper in the *Journal*, Vol. XVII. Part I. p. 239, says that from 5 lbs. to 6 lbs. of butter per week throughout the year is a good average from one cow.

The popularity of the breed may be gathered from the number of entries at the Society's Shows. Take, for instance, the Kilburn International Show ten years ago, when they numbered 253 out of a total of 930 of all British breeds put together, the Shorthorns numbering 179, and the Sussex cattle standing third on the list with an aggregate of 95. Their number this year at Windsor was 434, out of a total of 1637 of all breeds of cattle. This large number was made up of 30 aged Bulls, 34 two-year-old Bulls, 46 yearling Bulls (110 bulls of all ages), 64 Cows calved in or before 1885, 40 three-year-old Cows and Heifers, 101 two-year-old Heifers and 119 yearling Heifers (324 cows and heifers of all ages), thus giving 434 as the number of Jerseys entered. The Judges of the male and female sections severally have given the following very full reports :—

Report of the Judges of Jersey Bulls.

[Classes 135 to 137.]

Agreeably with the instructions received, the Judges forward a report of the Classes brought before them.

It is perhaps unnecessary for them to remark that in their awards they have adhered to the principle that the animals must be considered for breeding purposes solely, with the view to improve the established quality of the breed, combined with symmetry of form.

As to the properties of the breed, these are altogether based upon rich dairy qualities—the abundant yield of rich creamy milk.

The object, therefore, of the breeder of Jerseys must be carefully to select his breeding stock so as to maintain those properties, and steadily move in the direction of further improvement. This can only be attained by a due observance of all the features which together combine to form the standard of excellence.

In this breed, as in all others, there are types and strains which have their peculiarities; there are those which are greater milkers than others, those which last longer in milk, those whose milk is not so abundant but of a richer nature. It is, therefore, the blending of these properties to the best advantage which the breeder must keep in view, and the Judges of this stock must, in their awards, be guided by a combination of these points, together with gentleness and symmetry.

CLASS 135. *Bulls calved in the year 1883, 1884, 1885, or 1886.*—This, the Judges venture to say, was the finest lot of aged Jersey bulls ever brought together. In their experience they have never seen any lot to compare with them. There were many animals outside of the prize-takers which could have borne those honours with distinction. In this Class there were 30 entries, of which 28 came before the Judges. No. 1840 (Mr. Francis Le Brocq's *Castor*), to which the FIRST PRIZE was awarded, is, for excellence in quality and levelness, good head, neck, and shoulders, specially noticeable. No. 1854 (Mr. F. Parkinson's *Melbourne*), which obtained the SECOND PRIZE, is a well-grown, long, deep animal, and a good mover. No. 1837 (Mr. J. R. Corbett's *Franciscan*), which came in for the THIRD PRIZE, shows a fine forehead, and many other good points. The RESERVE NUMBER was given to No. 1852 (Mr. J. Brutton's *Dog Fox*), an aged bull, of undoubted merit, which was also HIGHLY COMMENDED. The HIGHLY COMMENDED animals were Nos. 1825, 1828, 1838, 1844, 1847, 1848. The COMMENDED were Nos. 1829, 1832, 1835, 1839, 1842, 1843 and 1853.

CLASS 136. *Bulls calved in 1887.*—This Class was represented by 34 entries. The FIRST PRIZE, No. 1868 (Mr. James Blyth's *Grouville's Champion*), is an animal well deserving of the position he attained; he is both fine and rich in quality. No. 1872 (Mr. A. McMullen's *Royal Cicero*), a dark grey, very level, with many good points, obtained the SECOND PRIZE, whilst the THIRD PRIZE went to No. 1860 (the Duke of Marlborough's *Pluck*), also a dark grey, well marked, with much merit, and the RESERVE to No. 1885 (Mr. W. Arkwright's *Hamilton*), an animal denoting richness, for which he was HIGHLY COMMENDED. The HIGHLY COMMENDED, which also included some very good specimens, were, 1857, 1861, 1863, 1864, 1867, 1870, 1877, 1879, 1881, 1884. The COMMENDED were, Nos. 1865, 1871, 1876, 1882, 1888.

CLASS 137. *Bulls calved in 1888.*—This Class, as might have been expected, was the most numerous; there were 42 entries. To No. 1901 (Mr. Freeman Thomas's *Lord Ratton*), an animal very straight, well-grown, with good neck and shoulders, and of good quality, was awarded the FIRST PRIZE. The SECOND PRIZE was taken by No. 1933 (Mr. Howard-Vyse's *Mazzini's Lad*),

also possessing much excellence; the THIRD PRIZE by No. 1906 (Mr. George Simpson's *Bacchus*), a smaller animal very well marked; and the RESERVE by No. 1920 (Mr. S. H. Hyde's *Plemont*), fawn-coloured, of good promise. HIGH COMMENDATIONS were awarded to 1892, 1896, 1897, 1915, 1916, 1917, 1919, 1934, and COMMENDATIONS to 1890, 1893, 1894, 1923, 1925.

The GOLD MEDAL given by Her Majesty the Queen for the best animal exhibited in Classes 135 to 141 was awarded by the Judges of bulls and cows to the bull No. 1840 (Mr. Le Brocq's *Castor*), above referred to. This animal was also the winner of the SILVER BOWL offered for the best male, in Classes 135, 136, 137, by the English Jersey Cattle Society.

The Judges cannot close their report without a remark in allusion to the enormous expansion which Jerseys have taken at the Shows of the Royal Agricultural Society. The number and general excellence of the bulls which they are here reporting upon, when contrasted with the Classes formerly exhibited at the Society's Meetings, proves not only that the breed has become more esteemed, but that its real worth is better understood and more appreciated. It must be highly encouraging to its supporters to have seen so grand an array together in competition at this great meeting.

CHAS. PH. LE CORNU.

ALFRED THOS. MATTHEWS.

HERBERT A. RIGG.

Report of the Judges of Jersey Cows and Heifers.

[Classes 138 to 141.]

In last year's report the Judges of Jerseys remark, "To make this report of interest to those who in the future may not at the time of reference have a copy of the catalogue available, we have since the close of the Show gone carefully through the skeleton judging books with the catalogue, and added the names of the animals, their exhibitors and breeders." We have followed the same plan on this occasion.

CLASS 138—*Cows in Milk or in Calf, calved previously to or in the year 1885*—consisted of 62 entries with very few absentees. The animals submitted reached a very high standard of average merit. The FIRST PRIZE was awarded to No. 1983, *Snowflake*, bred by Mr. C. Le Sueur, of Jersey, and exhibited by Mr. Arkwright, of Sutton Scarsdale; a cow showing excellent dairy points, both as regards quantity and quality of milk; the handling and touch of skin on the body and milk vessel are notably good. Her frame also is good, the back being level, hipbones well-placed, body deep, and horns fine and full of quality. Her colour is rich, and the escutcheon a fine broad type of Flandrine. Some might take exception to her being bare of flesh, but we consider this to be due to her milking properties, and not to any lack of constitution. SECOND PRIZE, No. 1991, *Linda's Belle*, was bred by Mr. Le Gros, of Jersey, and exhibited by Mr. Cornish, of Sherborne; a very attractive cow, but inferior in handling and in general quality to the First Prize; and we consider her also to rank below her in the butter-yielding property of her milk. THIRD PRIZE, No. 1960, *Rosy 3rd*, bred by Mr. Alexander, of Jersey, and exhibited by Mr. Simpson, of Reigate, is a rich and symmetrical cow, a trifle heavy in the horn. RESERVE NUMBER and HIGHLY COMMENDED, No. 1962, *Bessie*. This grand old dairy cow is getting past her prime, and therefore appears in the showing at some disadvantage. She was bred by Mr. Mourant, of Jersey, and exhibited by Mr. Simpson. HIGHLY COMMENDED: No. 1941, *Pretty Maid*, bred by Mr. Firminger, of Jersey, and exhibited by Mr. W. Adams of Gloucester, a fine rich cow with a strong constitution: No. 1967, *Lemon Blossom 2nd*, bred by Mr. Billot, of Jersey, exhibited by Mr. Carter, of

Ryde, Isle of Wight; No. 1979, *Mermaid*, bred and exhibited by Mr. A. Le Gallais, Jersey, a fine deep-bodied old cow with large and symmetrical udder, a most valuable cow to breed from; No. 1968, *Heartsease*, bred and exhibited by Lord Poltimore; No. 1989, *Sultane 11th*, bred by Mr. Marett, of Jersey, exhibited by Mr. Brutton, of Yeovil; No. 1937, *Hips*, bred and exhibited by the Hon. Mrs. C. Howard, of Great Missenden; a finely-shaped cow, and a large milker, deficient in richness; No. 1940, *Belle Bergère*, bred by Mr. Le Scelleur, Jersey, exhibited by Mr. Tower, of Brentwood; No. 1949, *Lady Julia*, bred by Mr. Le Brocq, jun., Jersey, exhibited by Mr. Crookes, Meopham; No. 1950, *Golden Crown*, bred by Mr. Arthur, Jersey, exhibited by Mr. Crookes; No. 1957, *Gloaming*, bred and exhibited by Mr. W. E. Budgett, of Bristol; No. 1958, *Prima Donna*, bred by Mr. De la Montais, Jersey, exhibited by Mr. Budgett; No. 1973, *Beauty*, bred by the late Dr. Meadows, of Slough, exhibited by Mr. Hugh Smith, of Roehampton; No. 1998, *Happy*, bred and exhibited by Lord Chesham; No. 1966, *Wolseley's Fancy*, bred by Mr. P. Le Feuvre, exhibited by Mr. G. W. Palmer, of Reading.

In addition to the above, which were all Highly Commended, several animals in this Class obtained Commended cards from the Judges.

CLASS 139—*Cows or Heifers in Milk or in Calf, calved in the year 1886*—was the least numerous Class, though still numbering 40 entries, and contained scarcely a single bad specimen of the breed. THE FIRST PRIZE was awarded to No. 2014, *Mabel 19th*, bred by Mr. W. J. Labey, of Jersey, and exhibited by Mr. Simpson; a fine type of a young dairy cow, and the best in a Class of good ones. SECOND PRIZE, No. 2030, *Bay Leaf 4th*, bred by Mr. P. Arthur, of Jersey, exhibited by Mr. Brutton, Yeovil; a rich substantial heifer, with fine handling and good escutcheon. THIRD PRIZE, No. 2029, *Golden Lass 4th*, bred by Mr. Marett, of Jersey, exhibited by Mr. Brutton. RESERVE NUMBER, 2004, *Bayleaf 3rd*, bred by Mr. J. A. Desreux, Jersey, exhibited by the Duke of Marlborough; a level little animal, with a good udder and squarely placed teats, but not good in touch, and a trifle fleshy. No. 2016, *Victoria*, bred by Mr. J. Falle, Jersey, exhibited by Mr. J. Blyth, of Stanstead; No. 2033, *Madeira 3rd*, bred by Mr. Renouf, Jersey, exhibited by Mr. Cornish; No. 2017, *Lady Safety*, bred by Mr. Vardon, Jersey, exhibited by Mr. Blyth; No. 2003, *Velvet 2nd*, bred by Mr. Hyde, of Kempton Park, exhibited by the Duke of Marlborough; No. 2006, *Sophia*, bred and exhibited by Right Hon. W. H. Smith; No. 2008, *Imperiale 3rd*, bred by Mr. Mauger, Jersey, exhibited by Mr. Tower; No. 2018, *Junio*, bred by Lord Brooke, exhibited by Mr. Blyth; No. 2019, *Wrangler's Fancy*, bred and exhibited by Mr. G. W. Palmer, of Reading; No. 1999, *La Folie's Pride*, bred by Mr. P. Le Sueur, Jersey, exhibited by Mr. McMullen, Hertford; No. 2005, *Mildred 6th*, bred and exhibited by Mr. Corbett, of Betchworth; No. 2025, *Milkmaid 13th*, bred by Mr. Simpson, exhibited by Hon. G. W. Bampfylde.

The above were all Highly Commended. They are attractive animals, and valuable for breeding purposes, as well as for the dairy. We select the first three on the list as representing our choice among the lot. Five others in this class were Commended.

CLASS 140—*Heifers calved in 1887*—brought together over 90 animals; an enormous Class, naturally not quite so select throughout as the preceding. After careful inspection, five animals were withdrawn by the Judges as of conspicuous merit. FIRST PRIZE, No. 2099, *Brebis 6th*, bred by Mr. T. Le Sueur, Jersey, exhibited by Mr. F. Le Brocq, Jersey. A grand-looking rich heifer with an almost model udder; in colour, perhaps, too red a fawn for everybody's taste. SECOND PRIZE, No. 2098, *Beaucoin 3rd*, bred by Mr. De la Haye, Jersey, exhibited by Mr. Le Brocq; a short stoutish heifer, not

perfect in touch, and with teats too small and not quite square, but possessing a redeeming merit in the shape and capacity of her udder. **THIRD PRIZE**, No. 2082, *Lady Prim*, bred by Mr. Perkins, of Holmwood, exhibited by Mr. Simpson; a good useful heifer, slightly thick in the setting on of the tail. **RESERVE NUMBER**, No. 2081, *Trifle*, bred and exhibited by Mrs. Perkins; a very attractive grey heifer, rather coarse in horn. **HIGHLY COMMENDED CARDS**: No. 2051, *Quality 4th*, bred by Mr. T. Le Sueur, exhibited by Mr. W. Adams; a robust and rich heifer, with a fine wide udder; we likewise awarded to No. 2040, *Solid Belle*, bred by Mr. Renouf, exhibited by Mr. Orange, Jersey; No. 2055, *Zerebat's Pandora*, bred by Mr. Simpson, exhibited by Lord Rothschild; No. 2059, *Flora 6th*, bred by Mr. G. Falle, exhibited by Mr. D. Tucker, Southampton; No. 2060, *St. Albans*, bred by Mr. Huelin, Jersey, exhibited by Mr. Tucker; No. 2068, *Midget*, bred and exhibited by Mr. J. B. Cole, of Weymouth; No. 2074, *Gavotte*, bred and exhibited by Lord Londesborough; No. 2085, *Fancy's Pride*, bred and exhibited by Mr. G. W. Palmer; No. 2089, *Fairy Elf*, bred by Mr. L'Amy, Jersey, exhibited by Mr. W. Alexander, jun., Jersey; No. 2094, *Semiramis*, bred by Mr. Le Quesne, Jersey, exhibited by Hon. G. W. Bampfylde; No. 2101, *Valentine*, bred by Mr. Remerelle, Jersey, exhibited by Mr. E. P. Fowler, Southampton; No. 2102, *Village Lass 2nd*, bred by Mr. Mollet, exhibited by Mr. E. P. Fowler, Southampton; No. 2118, *Lime*, bred by Mr. Fowler, Southampton, exhibited by Mr. E. Carter; No. 2119, *Honorine*, bred by Mr. Sauvage, Jersey, exhibited by Mr. Brutton; No. 2124, *Les Champs Rault 2nd*, bred by Mr. Cabot, Jersey, exhibited by Mr. G. Collas, Jersey; No. 2131, *Pet*, bred and exhibited by Mr. G. R. Fisk, Newport, Isle of Wight; No. 2136, *Golden Crown*, bred by Mr. Rossignol, Jersey, exhibited by Mr. Hyde; No. 2139, *Tottie*, bred by Mr. J. Hollingsworth, Windsor, exhibited by Mr. H. Howard-Vyse, of Slough. To twenty-four others Commended cards were awarded.

CLASS 141. Heifers calved in 1888.—This Class contained no less than 116 entries, with but few absentees, and the large show-ring was completely filled. It occupied nearly three hours to select the prize-winners from such a concourse. **FIRST PRIZE**, No. 2224, *Lucy 5th*, bred and exhibited by Mr. Budgett, of Bristol, shows exceptional merit in the levelness of her back and quarters, and in the very neat setting of her tail. The chine also is fine, and the skin good in touch and colour. Her stock, though not faultless, shows good promise. **SECOND PRIZE**, No. 2248, *Little Nell*, bred and exhibited by Mr. Hugh Smith. We could not ignore a calf of such obvious merit, even though one of the younger animals in her Class. **THIRD PRIZE**, No. 2164, *Maidenhair*, bred and exhibited by Mr. H. Howard-Vyse; a very symmetrical and taking silver-grey calf, with promise of a good udder. **RESERVE NUMBER**, 2225, *Beauty 6th*, bred and exhibited by Mr. Budgett; a nice little animal, not so good in touch as the other three. Highly Commended cards were given to thirty-three animals in this class, and there were eighteen Commendations.

In reviewing this class, we are gratified to find that it is so largely composed of home-bred animals, and that there is, as appears to us, a marked advance in the merit of the exhibits. We noticed very few defective udders, and many that gave early promise of rich milk. Moreover, the quality of the best animals is undeniable. We could point to several, besides the three prize-winners, that for fineness of bone and general quality might well bear comparison with the best island-bred heifer calves. Will our conditions of climate and of pasturage permit them to reach maturity without losing these characteristics?

CHAMPION PRIZE for Female Jerseys. The First Prize winners in Classes 138, 139, and 140 being brought out for this competition, the

Judges had no hesitation in awarding the prize to the eight-year-old cow, No. 1983, *Snowflake*, exhibited by Mr. Arkwright, and already described under her Class.

WILLIAM ASHCROFT.
JOHN FREDERICK HALL.

GUERNSEY CATTLE.

The Guernsey Judges, like the Hereford Judges, give a reason why aged cows and three-year-old cows or heifers should not be judged together. The Hereford Judges say that the cows have no chance against the heifers; the Guernsey Judges that the heifers have no chance against the cows. Both are right. The Hereford, a beef breed, has the beef-points in perfection at three years old or under; the Guernsey, a dairy breed, does not mature the dairy points until the cow is of full age.

We have seen in the introductory notes to the Channel Islands breeds that the Guernsey has not, like the Jersey, had an unbroken course of nineteen years in special Classes at the Society's Shows; that although for twelve years after the separation from the Jerseys, 1871-82 inclusive, it had them, three years without them immediately followed, and the present year is only the fourth of its restoration to the schedule. The reason is not far to seek. It has been very uncertain in competition, sometimes, as this year at Windsor, enormously strong; sometimes, as at Liverpool in 1877, miserably weak. Although now established in England, with an English Herd-book, it has not yet spread itself over the country like the Jersey. The Classes at Windsor, which were very good indeed throughout, were filled mainly from the southern counties of England, about 112 entries having come from southern districts of the English mainland, ten from the Isle of Wight, seven from the northern counties (Yorkshire and Cheshire), and seven from the native island of the breed: five entries not included in the above enumeration had been withdrawn. The aged Bulls numbered ten; yearling and two-year-old Bulls in one Class, twenty-six, one withdrawn; aged Cows and three-year-old Cows and Heifers in one Class, fifty-two, four withdrawn; three-year-old Heifers, twenty-two; and yearling Heifers, thirty-one.—Total, 141 entries, including the five withdrawn. The Judges, like those of the Jersey Classes, have supplied ample descriptive particulars.

Report of the Judges of Guernsey Cattle.

[Classes 142 to 146.]

We have to report that all the Classes are of exceptional merit. That for cows or heifers calved in or before 1886 was without doubt the best collection of animals of the kind ever got together, and contained several

cows each of which might have received a first prize. We would respectfully suggest to the Council, that in view of the large number of entries in the Guernsey Classes at this Show, and the daily increasing favour which the breed is now receiving, it would be well to increase the number of Classes, and to treat Guerneys in the same way as the Jerseys. We would specially call the attention of the Council to Class 143, for bulls calved in 1887 or 1888. It is almost impossible to judge such animals with either satisfaction to ourselves, the owners, or the public, some exhibits being more than two years old, while others are considerably under a year. The same remarks apply to Class 144, where heifers in calf for the first time have to compete with the old cows, with which they have but little chance in competition. We trust the Council will favourably consider these remarks, which we are confident represent the views of all Guernsey breeders, both in England and in the island itself, and that next year the breed will receive greater encouragement from the Society, to which its position in public estimation justly entitles it. It is impossible in this report to bring all the deserving animals under review, but we have endeavoured to notice the most prominent.

CLASS 142. *Bulls calved in 1883, 1884, 1885, or 1886.*—Although the entries were comparatively few, the animals were of high merit. The FIRST PRIZE, No. 2264 (Mr. W. H. Carrington's *Rydale*), which also gained the QUEEN'S MEDAL and the SPECIAL PRIZE for the best bull, is an animal of great quality and grand appearance. We understand he obtained the first prize in the island at the annual Show this year, and he easily obtained premier position at Windsor. *Rydale* is a very straight level bull exceptionally good in loin and over the rump, with a deep full barrel; he shows every point desirable in a bull for dairy purposes. No. 2259 (Sir F. A. Montefiore's *Sir Francis*), the SECOND PRIZE, also easily gained his position; he is a well-known animal, and certainly was never better shown than he was here. He has a grand frame and is of rich colour, and has an admirable skin; he is perhaps a little flat-sided as compared with *Rydale*, but is, notwithstanding, a grand animal. No. 2261 (Mr. H. Stanley Morris's *Norman*) stands THIRD; he is in many respects a good bull, but is certainly "throaty" and is deficient above the tail; he has, however, a first class curveline escutcheon, and is of rich quality. RESERVE NUMBER is 2268, Mr. Glynn's well-known Bull *Hopeful*. Like everything else he cannot last for ever, and though still a good level bull, age begins to tell, and he has had to give place to others. No. 2267 (Mrs. Parson's *Conservateur*), an island bull, is of good quality, but the company was too good for him. This Class as a whole merits and receives our warm commendation.

CLASS 143—*Bulls calved in 1887 or 1888*—gave us much trouble from the cause mentioned in the beginning of this report. There were in it 25 entries, and although there was nothing so surpassingly good in it as in the previous Class, some excellent and promising animals were shown. The FIRST was No. 2282 (Mr. W. J. Beckingham's *Loftus*), bred in England by Mr. Long. This is a young bull of June 1888; he is very rich in quality, with excellent quarter and fair escutcheon, good colour and of elegant appearance, and promises to develop into a really good animal. No. 2275 (Colonel Macleay's *Pépin 4th*) is SECOND. In some respects this is a better bull than the winner, being deeper and fuller in the barrel, but he is terribly "throaty," and will always suffer from this in competition; he is however level, and his false teats are good and well placed. THIRD PRIZE went to No. 2288 (the Express Dairy Company's *Bonnie Laddie*). This is a large bull with a strong resemblance to his sire "Sterling," who was always coarse; he has, however, good points, being level and having a deep barrel; he is, however, very white, and is lacking in quality. He

was well shown, and his large size gave him a taking appearance. RESERVE NUMBER 2294 (Mr. W. A. Glynn's *Surprise*) is a straight bull, fair quality, but with a dreadfully heavy throat.

CLASS 144—*Cows or Heifers in Milk or in Calf calved previously to or in 1886*—came next. In number, quality, and excellence, such a Class of Guernsey cows has never been seen before. FIRST PRIZE went to No. 2334, *Pretty Dairy Maid*, owned by Mr. D. Le Patourel, of Guernsey. This is a cow of altogether exceptional merit, indeed a splendid and almost perfect specimen of a Guernsey cow. She evidently was suffering from heat and her long journey, and did not give her milk down in the same free way as in the succeeding days of the Show, but for all that she gave eleven quarts when milked in the ring. This cow was first in the island Whitsun Competition, and when officially tested in the island gave an average of twenty-four quarts a day. Exception was taken by some disappointed exhibitors to her bag, which seemed perhaps "fleshy," but surely such a milking record disposes of such exception. She is a cow of grand quality, wonderful length, splendid milk veins, and rare escutcheon. She is a trifle long in the horns, probably a defect that would not have been allowed had she been in other hands, more experienced in "getting up" for showing. We had no difficulty in placing this cow First, and subsequent close examination of the Class confirmed us in our judgment. The only doubt that existed was whether or no she should receive the Queen's Medal. No. 2345 (Mr. W. A. Glynn's *La Belle*) is a well-known cow and prize winner. She is in some respects a more "taking" cow than the winner, being of a gayer colour and stouter make. She is without doubt a grand animal, level and rich in quality, but not nearly so fine in the chine as her conqueror. She has a fine silky bag and good milk veins, fair escutcheon, and is evidently a cow of good constitution, and one that would easily have won if "*Pretty Dairy Maid*" had not been shown. The THIRD, No. 2296 (Sir F. A. Montefiore's *Lady Ethel 2nd*), an island-bred cow, by the famous bull "*Presto*," is a splendid specimen of the breed. She was perhaps a little too fat, but is of admirable quality and touch, a beautiful head and milk vein. RESERVE NUMBER went to No. 2315 (Mr. Morris's *Sunflower*), a beautiful cow, as also is her mother *Blossom*, No. 2316, which would have been higher in the list if she had not a black nose. No. 2319 (Mr. Morris's *Lady Emily Foley 3rd*), HIGHLY COMMENDED, is also a fine old cow, but she droops a little at the rump and is not so fine in the throat as she might be. No. 2299, HIGHLY COMMENDED (Sir F. A. Montefiore's *Constance 2nd*), has recently calved, and has not recovered her show form, but she is a lovely animal and of excellent quality. No. 2328, *Ladybird 2nd*, belonging to the Express Dairy Company, is HIGHLY COMMENDED. This is a well-known cow and prize winner, at her best inferior to none, but here rather thin and stale, but still a cow of wonderful quality, very level and splendid milk veins, not so perfect in one quarter as she once was, but still a grand cow and fine specimen of the breed. No. 2340, HIGHLY COMMENDED (Mr. Julian Stephens' *Muriel*), a pretty heifer though rather small, but good head and horns and nice escutcheon. No. 2338 (Sir J. F. Lennard's *Lady No. 13*) is a good cow of fair quality and markings, but outclassed here. No. 2346, HIGHLY COMMENDED (Mr. W. A. Glynn's *Jessie 2nd*), a very nice cow, but distanced by her companion "*La Belle*." There were many good animals which did not receive cards, notably No. 2325 (Lord Londesborough's *Lady Flora*); Mr. Wakefield Christy's *Mountain Maid 2nd*, No. 2326; Mr. George Long's *Lily de Candie 3rd*, 2309; and the Express Dairy Company's *Fair Maid*, No. 2329. Time and space forbid a longer description of a truly wonderful class.

CLASS 145. *Heifers calved in 1887*.—Twenty-one entries.—FIRST, No.

2354: a heifer imported by Mr. E. P. Fowler. This is a very rich level heifer, very fine in the chine, good escutcheon and milk vein. She probably was not seen at her best, as she was about to calve at the time of judging, and, in fact, did so shortly afterwards. SECOND, No. 2363 (*Golden Treasure 3rd*, belonging to the Express Dairy Company): a well-grown heifer with capital udder, good chine, and fair escutcheon. THIRD, No. 2359 (Mr. George Long's *Nora 3rd*): a very pretty heifer, stylish and with a good udder; she promises to make a beautiful cow, as does the same exhibitor's COMMENDED heifer, *Colona 1st*, No. 2358. RESERVE is No. 2362 (the Express Dairy Company's *Polly 4th*): a good level heifer with well-formed udder, wanting rather in escutcheon.

CLASS 146. *Heifer, calved in 1888*.—We had no difficulty in placing as FIRST No. 2398 (Mr. W. A. Glynn's *Amelia*), ten months old, a most sweet heifer, straight, level, of wonderful quality and touch, and rich withal. SECOND, No. 2371 (Colonel Macleay's *Damsel 1st*): an older heifer than the first, and necessarily larger; also a straight good heifer, but not so rich in quality as that winner, and not so perfect in the throat. THIRD is No. 2396 (Mr. Barclay Field's *Mary*): a really nice heifer, but fattened as if she were meant for a Christmas show; she was in consequence thick and heavy about the neck; probably would have been higher in the list if it had not been for this. RESERVE, No. 2376 (Mr. Stanley Morris's *Arrogante 5th*): level, fair in udder, and nice head. No. 2399 (Mr. W. A. Glynn's *Gipsy Queen*) is HIGHLY COMMENDED: a good heifer, but plain when standing beside her companion "*Amelia*." Although there are other good and nice animals in the Class, we do not think it necessary to particularise them further.

In conclusion, we would congratulate the Society not only on the number of Guernseys exhibited at their Jubilee Show, but also on the wonderful excellence of the animals themselves.

ARTHUR BAILLIE-HAMILTON.
JAMES JAMES.
ANDREW RINTOUL, Jr.

KERRY AND DEXTER KERRY CATTLE.

Although these useful little breeds—exceedingly serviceable in their way, adapted to purposes for which larger breeds would be unfit—were deservedly classed separately, they may be noticed here under one head. It is needless to say that the true Kerry is a wonderful milker, and of hardy constitution—although no one who wants much milk will care to expose his dairy cows to severities of weather of any kind. It is now the one remaining distinctively Irish breed, and Irish cattle were first named in the Society's schedule for Windsor, 1851, although they were classed with Welsh and other pure breeds. The Kerry cattle were classed by name at the two International Shows, Battersea 1862 and Kilburn 1879, and also at Newcastle 1887.

The Dexter—to whatever cross it is indebted for its variation from the old Kerry type—is often also a deep milker, and can breed up to most wonderful proportions of depth and thickness, on its tiny, compact frame. When of a red colour, as it some-

times is, it has been known to present the appearance of a grand Shorthorn seen through the wrong end of a telescope. The blue grey is one of its somewhat attractive varieties of colour.

Both Kerries and Dexters made a really beautiful display of their respective merits, and will no doubt consequently increase their number of English admirers. They only need to be well known to insure a keen demand, in these days of growing attention to small, useful breeds, easy to keep, and ornamental.

The Kerry Classes numbered—Bulls, fifteen; Cows, forty-seven; two-year-old and yearling Heifers (one Class), fifteen; altogether seventy-seven. Dexter Kerries—Bulls, twelve; Cows, thirty; two-year-old and yearling Heifers, seventeen; male and female of all ages, fifty-nine. Total of Kerry and Dexter Kerry Classes, 136.

Report of the Judges of Kerry and Dexter Cattle.

[Classes 147 to 152.]

We are glad to be able to report a great improvement in every section of these Classes, evidently showing a greatly increased interest taken in these very useful animals by the general public.

We wish to note the splendid class of cows in both cases—particularly the Kerries—than which a finer lot has never been seen together; but we would further remark that three-year-old heifers, in milk, show to great disadvantage amongst cows, and suggest that in future separate Classes be provided.

We are extremely glad to see that our English friends take such an interest in these tiny breeds, and it is also satisfactory to us to show them that we can supplement the produce of the Kerry mountains with something more profitable than furze and heather.

LUKE CHRISTY.

BERNHARD HAYDEN.

ANY OTHER BREED OF CATTLE.

Dutch, Swiss, and Montgomery cattle (the latter a species of Welsh) competed in the miscellaneous Classes. Dutch bulls, Swiss cattle among the cows and heifers, took the Prizes, whilst a Dutch cow had the Reserved Number, and a smoky-faced Montgomery a Commendation.

Report of the Judges of "Any Other Breed" of Cattle.

[Classes 153 and 154.]

The cattle of "Any Other Breed" were not a very good lot, and in our opinion were not of any special merit.

ANDREW ALLAN.

ANDREW MONTGOMERY.

DAIRY CATTLE.

The chief interest of this department attached to the tests of quantity of milk with percentages of solids and butter-fat, but as these belong to the report on the Dairy department of the Show, further reference here would be out of place.

Much has been said and written at different times and in various places in disparagement of "the show system." The writer of this Report, having frequently attended the Society's exhibitions for more than thirty years, and, for the purpose of contributions to the agricultural press, having on several occasions traced the history of the principal British breeds of cattle in connection with the Society's meetings and influence, ventures to suggest that no one who has gone carefully over the same ground, with or without prejudice at the beginning of his work, can fail to recognise the vast benefits conferred upon both the agriculturist and the consumer of his produce by the Royal Agricultural Society of England, in the impetus which its influence has given to the development and extension of the most useful breeds of cattle; nor is it possible, he believes, to doubt that in the same direction lies further work of incalculably great importance.

XXXI. *Report on the Sheep, Goats, and Pigs Exhibited at Windsor,*
1889. By R. HENRY REW.

SHEEP.

SHEEP are still the backbone of husbandry. If we do not now, as in ancient times, express wealth in terms of sheep, nevertheless the tale of the national flocks is even yet a not unfair indication of agricultural prosperity. "If," said Professor Owen in his lecture delivered in connection with the Great Exhibition of 1851, "the test of the value of a domestic animal be the numbers on the preservation of which human care is bestowed, and on the extent of the habitable globe over which mankind has diffused the species, then the sheep takes the first rank." Just as the origin of the domesticated sheep is wrapped in obscurity, so also its agricultural importance dates from time immemorial. A history of sheep would be a history of agriculture. The brother of the earliest tiller of the ground was a shepherd. The most ancient records—sacred or profane—speak

of sheep as an animal already domesticated for the food and clothing of man. The erudite author of *Textrinum Antiquorum* supports this contention by a host of references from the classics, to which those who are curious may be referred.

The antiquity and importance of sheep are not less striking locally than universally. British sheep date certainly from the prehistoric period. We do not know much about the Ancient Britons, and we know still less of their flocks. That they possessed them is a fair assumption. As the late Mr. John Coleman, in his work on *The Sheep of Great Britain*, remarks:—"Writers who have assumed that because the oldest records contain no mention of them, that therefore they did not exist, appear to forget that the same reasoning might apply to the country itself." Shortly after the conquest of Britain by the Romans there is record of a woollen manufactory being established at Winchester—a circumstance from which the breeding of sheep in this country at that time is fairly deducible. In fact, as Lord Cathcart observes in his interesting article on Wool,¹ in the *Journal* for 1875, "the more we study the history of the subject the more we are taught that wool and the wool-trade was the foundation of our English commercial prosperity."

Two prominent factors in the making of this land of ours originated about the same time. Parliament and the wool-trade both rose into importance at the end of the thirteenth century. The late J. R. Green² has a passage which, without undue straining, might justify us in claiming that the latter was at least partly the cause of the former. He refers to "the long peace and prosperity of the realm, the extension of its commerce, and the increased export of wool" as tending to form that middle class which was to check the power of the barons and to form the Commons of England. But, if the wool-trade had anything to do with the creation of Parliament, Parliament was amply avenged. Barely a century ago the statute-book contained no less than 311 laws relating to wool and woollens. An industry which has survived such treatment deserves at the least our respect. It did survive and flourish, and to this day the official seat of the Lord Chancellor testifies to the fact—first recognised by this token in the reign of Queen Elizabeth—that wool was the foundation of England's greatness.

But, except in vindication of the dignity and importance of the subject, the ancient records of sheep-breeding have little present interest. Broadly speaking, it may be said that within

¹ *Wool in relation to Science with Practice*, Journal R.A.S.E., Vol. XI. 2nd Series (1875), p. 315.

² *Short History of the English People*.

the limits of little more than a century lies all the history of British sheep which practically concerns us nowadays. The breeds of to-day have as little in common with the sheep of two or three hundred years ago as the nineteenth-century Englishman has with his Saxon or Norman progenitors. It was towards the latter part of the last century that one or two thoughtful men grasped the simple, but then novel, truth that a sheep does not, or need not, live for wool alone. Robert Bakewell of Dishley was the first and the most prominent of these reformers. He went, possibly, to extremes, and sacrificed, as is alleged, the fleece too recklessly in his new-born zeal for the improvement of the carcass, but he unquestionably did a great work and laid the foundation of British sheep as we know them now. After him arose another giant of those days—John Ellman of Glynde—who did for the Short-wools what Bakewell did for the Long-wools. These two men represent the two movements whence came the improvement of the national flocks. There was another movement—which seemed for a time to have more impetus than either—having for its aim the introduction of the merino. Happily (for it would no doubt have checked the improvement of mutton without giving a compensating value to wool) this failed, notwithstanding the efforts of an influential society formed for the express purpose of supporting it.

At the time when the Royal Agricultural Society was started, the two broad streams of amelioration which flowed from Dishley and Glynde respectively had overswept the country. There was scarcely a district which the improved Leicester had not invaded, scarcely a breed on which it had not left some impress. The improved Southdown, if less ubiquitous, had exerted an influence not less potent, and had helped to lay the foundation of breeds which long ere this have rivalled it in importance and fame. A spirit of alertness and enterprise was abroad. The then recent discovery of Liebig that the natural heat of the body is maintained by food, that cold is accordingly wasteful to the stock-keeper, and that consequently sheep will thrive better and fatten quicker with warmth and shelter, had just been practically grasped by flock-masters. Lord Spencer, in the earliest pages of the *Journal*, urged the necessity of keeping "accurate pedigrees" of cattle and sheep, while Mr. Pusey announced that the new Leicester, or a Leicester and Cotswold cross, effected a saving in the cost of production (by reason of its early maturity) amounting to 20 per cent. In the *Farmer's Magazine*, a Hampshire sheep-breeder, Mr. Twynam, was challenging, through Lord Spencer, the flockmasters of the country to a trial of twenty-five wether lambs to be wintered on

arable land, with the view to determining the greatest value in wool and mutton of the several breeds.

The number of breeds of sheep then existing in the country was remarkable. Many of them were distinguished by a plentiful lack of all the qualities which make for profit, and either died out, or entirely changed their character before the invasion of the improved breeds. It may be of interest to give a list of the varieties of sheep which were to be found when the Royal Society was established, side by side with the list of present breeds as set forth in the Windsor catalogue.

1839.	1889.
Leicester (Dishley)	Leicester
Lincoln	Border Leicester
*Teeswater	Cotswold
Cotswold	Lincoln
Romney Marsh	Oxford Down
Bampton Notts	Shropshire
South Ham Notts	Southdown
Irish (polled)	Hampshire Down
Southdown	Suffolk
*Wiltshire	Somerset and Dorset Horn
Dorset	Kentish, or Romney Marsh
Portland	Devon Longwool
Exmoor	Ryeland
Dartmoor	Dartmoor
Cornish	Exmoor
Ryeland	Wensleydale
Dean Forest	Roscommon
*Mendip	Limestone
*Norfolk	Cheviot
*Cannock Chase	Black-faced Mountain
Penistone	Herdwick
Shropshire Morfe	Lonk
Delamere Forest	Welsh Mountain
Herdwick	
Cheviot	
Scotch Heath (Black-faced)	
Shetland	
Welsh Mountain	
Wicklow Mountain	
Kerry	
Merino	

Those breeds marked with an asterisk in the first list were recorded as becoming extinct at that time, and others, as will be noticed, have died out in the interval or have been amalgamated. The list, it should be added, is compiled from Professor Low's standard work on domesticated animals, and from the work on British Husbandry published by the Society for the

Diffusion of Useful Knowledge. It cannot, of course, be claimed that either list is completely exhaustive, but each is sufficiently indicative of the position of British breeds of sheep at the respective dates.

The fifty Royal Shows which have been held need no justification, but if they did they would find the most remarkable testimony to their influence in the sheep section. Some of the most popular breeds of the present day owe their position very largely to the annual exhibitions of the "Royal." Where, for instance, to-day would the Shropshires, the Oxford Downs, the Hampshire Downs, the Devon Long-wools, and the Suffolks be but for the encouragement and advertisement which the Royal Shows have given them? All these breeds have practically sprung into fame during the past half-century, and all have been—as their friends are foremost to admit—indebted largely for their success to the support of the Royal Agricultural Society.

SHEARING.

From the earliest Show downwards there has been more or less trouble about the shearing of the sheep exhibited. It culminated at the Worcester Show in 1863, when Mr. Dent, in his report as Steward, made some forcible remarks about the unfair shearing and the incessant clipping and trimming. He expressed a strong opinion that the Society should grapple with the question. At the next Show at Newcastle a regulation was adopted providing that all sheep should be "really and fairly shorn bare" after April 1 in the year of exhibition, and arranging for the appointment of "inspectors" to see that the regulation was carried out. A marked improvement was reported by the Stewards as the result, and the arrangement has been adopted ever since. It will be seen from the following report of the shearing inspectors at Windsor that the evil of unfair clipping is not yet quite killed, but there is no doubt that it has been "scotched":—

Report of the Inspectors of Shearing.

From the late hour of arrival of a large number of the sheep in the yard on Saturday morning we could not nearly complete our examination of the shearing. We now beg to state that we found the shearing of sheep much improved, in some Classes almost perfect; yet at the same time we must say there were cases where the shepherd tried to test our judgment, endeavouring to improve the *leg* of the sheep with a little false wool, though not in large quantities. Still, we found it so, and almost made an example of six or eight to make them true to their work in future years.

We have gone over the full yard of sheep again, and examined those not forward on Saturday evening. We had marked against three lots of

sheep—No. 2630, No. 2642, and No. 2643—and recommended same for disqualification, which we saw, from cards put up, was carried out. We cannot give our approval to so much dressing going on in the yard; some of the sheep are quite changed in appearance from Saturday night until our second inspection on Monday morning.

We have looked over all those not forward and in their place on Saturday, and find same to be in order.

June 24.

WILLIAM JOBSON.
J. B. WORKMAN.

LEICESTERS.

Fifty years ago the supremacy of the Leicesters was undoubted. They were distinctively the representative breed of the country. As such they rightly took the premier position in the prize-list of the first Oxford Meeting, and have ever since retained this place, notwithstanding that they have for some years past not been the most numerously represented breed at the Shows. In the early days of the Society there were practically only two breeds—the Leicesters and Southdowns—of sufficient influence to claim distinct classes. The Leicesters took the lead, inasmuch as at that time Long-wools were unquestionably in a majority. Professor Low, writing some forty-five years ago, remarked that, “with the progress of civilisation,” the Long-wools had gradually gained in numbers on the Short-wools. In olden times, before the land became generally enclosed, the predominant varieties of sheep were Short-wools, or Downs, which were suited to the nomad life of the open commons and moors. With the cultivation of the plains and valleys and the improvement of farming, Long-wools became more popular, and the influence of Bakewell gave them fame and importance. In later years, however, and since the Society was established, the pendulum has swung again, and it would be difficult now to say whether Long-wools or Short-wools form the larger part of the national flocks.

The story of the rise and progress of the “new Leicester” sheep has been often told, and never with more interesting detail than in the pages of the *Journal*¹ by Mr. H. H. Dixon. This was in 1868; but ten years earlier, Mr. Robert Smith, in his *Report on the Live-Stock at Chester*,² placed on record extracts from some curious documents relating to the famous Dishley Society, or “ring” as it would be called nowadays. One of the most remarkable of the many regulations to which these breeders pledged themselves was that which enjoined that “no member shall give his rams, at any season of the year, any other kind of food than green vegetables, hay, or straw.” What a revolution in feeding for show would be made if this rule were adopted now!

Vol. IV. 2nd Series (1868), p. 340. ² Vol. XIX, 1st Series (1858), p. 378.

The glory of the Leicester is that it is not only excellent in itself, but that it has been the cause of so much excellence in other breeds. Much of this work had been done before the Society existed, though it was going on even in 1839 in quarters where the "Leicester cross" has now become a disputed tradition.

At Windsor the entries of Leicesters numbered forty-one, and the chief prize-winners were Messrs. T. H. Hutchinson, R. and G. Harrison, David Linton, J. B. Green, and Mrs. Perry-Herrick. It is difficult to believe that the Leicesters ever were better in form or fleece than they are now. With their white legs and faces, heavy, well-grown fleeces, wonderful thickness through the heart, and straightness of line, they made a capital display, notwithstanding the rather lukewarm praise of the Judges.

COTSWOLDS.

As the Leicester, Cotswold, and Lincoln Classes came before the same Judges, it will be convenient to take them consecutively.

No variety of sheep makes a more handsome display in the show-yard than the Cotswolds, and there is none, too, about whose history there is more uncertainty. So far as living memory or definite record extends, the big white long-wool sheep as we now know them have inhabited the Cotswold Hills from time immemorial. But if they are indigenous they are an anomaly. The native breeds of the downs and uplands are elsewhere all small, active, and short-woolled. Adam Speed, too, writing early in the seventeenth century, speaks of the wool of the Cotswold as being similar to that of the Ryeland. On the other hand, Gervase Markham, in his *Way to get Wealth* (1657), speaks of the sheep of the "Cotsall hills" as having wool of "coarser and deeper" staple than that of the down sheep of Herefordshire and Worcestershire; and Mr. Spooner, in his work on *The Sheep*, is "disposed to think that the present are the descendants of the old race," though he does not attempt to substantiate the opinion. The opinion of Professor Low carries great weight, for from his careful pages most subsequent writers appear to have taken the bulk of their facts, and he evidently had no doubt that the present Cotswolds have taken the place of a different breed which was short-woolled. In the report on the farming of Gloucestershire which appeared in the *Journal*¹ in 1850, the writer, Mr. John Bravender, makes

¹ Vol. XI, 1st Series (1850), p. 164.

the simple statement, without either qualification or argument, that "the Cotswold sheep which have taken the name from having originated there are not the Cotswold sheep of the present day." There is a tradition—which, strange to say, finds an authoritative place in historical text-books—that the famous Merinos of Spain took their origin from certain "Cotteswolde sheep" sent by Edward IV. to the King of Arragon in 1464. The statement was first made by Stowe, who records the incident, but he was, no doubt, unaware that Spain was at that time already in possession of the best wool, and manufactured the finest woollen fabrics, in Europe.

The Cotswold breeders came, like all others of that day, under the influence of Bakewell, whether they used any sheep of his breed or no. It is certain that, early in the century, the sheep were greatly improved, and they are now remarkable for weight, symmetry, and wool. The Cotswold ram, as one saw him at Windsor, is of all south-country sheep most deserving the epithet "grand." His rakish-looking "lovelock," well-carried head, long, broad back, well-sprung ribs, and long curly coat give him a very attractive aspect. Mr. John Coleman remarks that "there can be no doubt that the establishment of the Royal and Local Agricultural Societies did much for this breed, formerly so little known." At the first Meeting of the Society the Cotswolds made a good show, although they could only enter in the "Long-wools other than Leicesters" section. At the fiftieth Meeting they also came out well with sixty entries, the prizes going to Messrs. George Bagnall, Robert Garne, Russell Swanwick, and Thomas Brown. The Judges give utterance to public opinion in their report that the shearlings "were the best lot shown for many years."

LINCOLNS.

The old breed of the Fens, like that of the Kentish marshes, was adapted to its environment. There was in Bakewell's time a keen rivalry between the Lincoln and the Leicester breeders. For this reason the improved Leicester was at first stringently excluded from Lincolnshire. But its obvious merits overcame prejudiced opposition, and the old Lincolns were crossed to a considerable extent with new Leicester blood. The breed still retained, however, its larger frame and heavier fleece. Arthur Young, in his "Survey" of Lincolnshire, reported that the new Leicesters were driving out the Lincolns from the poorer lands and improving them by crossing. "The true Lincoln is a larger sheep and with a longer wool, and therefore demands

better pasturage; where it finds such, the old breed remains. Upon inferior land the Leicester establishes itself, from the necessity of having smaller size and shorter wool." In 1851, when the late John Algernon Clarke wrote on the farming of Lincolnshire in the Society's Journal,¹ he stated that the pure old-fashioned Lincolns were then scarcely to be found, except in some few places in the south-eastern lowland and the rich eastern marshes. In point of fact, the breeders of the county, with much skill and intelligence, formed what was practically a new breed by selecting from the old stock and using a judicious mixture of Leicester blood. They thus, while retaining the large frame and unrivalled wool-producing qualities of the breed, imparted to it a more symmetrical shape and a greater aptitude to fatten.

The Lincoln breeders at one time cherished a grievance against the Society for its tardiness in providing separate Classes for their sheep. At Battersea, in 1862, Classes were provided, but owing, possibly, to an unwise feeling of resentment, the breeders failed to take adequate advantage of them, the display of the breed being reported as "weak in numbers and in stamp." It was not until eight years afterwards that separate Classes were again given, although most of the prizes during the interval in the "Lincoln and other Long-wool" Classes were won by sheep of this breed.

The wide renown of the present Lincoln breed does not date from earlier than 1850, but since that year it has made great strides in public favour, being largely drawn upon by foreign customers. Some twenty or twenty-five years ago, when wool-production was for awhile so lucrative, Lincolns made extravagant prices, one celebrated ram being let in five successive years at an aggregate of nearly 600 guineas. Their value, especially for exportation, is still great, and at the Windsor Show three Lincolns were said to have been sold for 500 guineas.

There were fifty-eight entries of this breed at Windsor, including an excellent Class of thirty-one shearlings. Only three names appear in the list of prizes, viz. those of Messrs. Robert Wright, Henry Dudding, and John Pears.

The following is the report of the Judges on the Leicesters, Cotswolds, and Lincolns, the names of the exhibitors of the sheep alluded to by them being here, as in other reports, added so as to render their remarks intelligible without reference to the list of awards:—

¹ Vol. XII. 1st Series (1851), pp. 259-414.

Report of the Judges of Leicester (Classes 157 to 160), Cotswold (Classes 165 to 168), and Lincoln Sheep (Classes 169 to 172).

CLASS 157. *Leicester Two-shear Rams*.—A fair Class, the three Prize winners being good specimens of the breed.

CLASS 158. *Leicester Shearling Rams*.—A very good Class, the FIRST (Mr. Hutchinson's) and SECOND (Mr. Green's) being good specimens of the pure Leicester.

CLASS 159. *Pen of Three Leicester Ram Lambs*.—Three pens of moderate lambs.

CLASS 160. *Pen of Three Leicester Shearling Ewes*.—A good Class.

CLASS 165. *Cotswold Two-shear Rams*.—A very commendable Class.

CLASS 166. *Cotswold Shearling Rams*.—The whole Class Commended, being 25 entries, the best lot of Shearlings shown for many years.

CLASS 167. *Pen of Three Cotswold Ram Lambs*.—A very good Class.

CLASS 168. *Pen of Three Cotswold Shearling Ewes*.—A splendid Class, the three Prizes going to the same owner (Mr. Swanwick).

CLASS 169. *Lincoln Two-shear Rams*.—Four entries only, the FIRST (Mr. Wright's) and SECOND (Mr. Dudding's) being very good animals.

CLASS 170. *Lincoln Shearling Rams*.—This was a large Class of very good sheep, the three winners going to one flock (Mr. Dudding's).

CLASS 171. *Pen of Three Lincoln Ram Lambs*.—A fair Class.

CLASS 172. *Pen of Three Lincoln Shearling Ewes*.—This was a very superior Class.

CHARLES CLARKE.

GEORGE TURNER.

THOMAS THORNTON.

BORDER LEICESTERS.

The Border Leicesters are, perhaps, the only breed whose origin can be assigned to an absolute date. It was in the year 1767 that Messrs. George and Matthew Culley, one or both of whom had been pupils of Bakewell, migrated from the Tees to the Tweed, and took with them a flock of Dishley Leicesters. They were followed soon afterwards by Mr. Robert Thompson, another of Bakewell's pupils, who established a Dishley flock first at Lilburn and then at Chillingham Barns. Others naturally followed their example, as the merits of the sheep became known. It is curious that the procedure of the early breeders of Border Leicesters is almost as uncertain as that of Bakewell himself. It is still a moot point whether any extraneous blood was introduced. Mr. John Usher, of Kelso, writing in Coleman's work on *The Sheep of Great Britain*, expresses an opinion that the Cheviot was used to some extent. On the other hand, Mr. John Wood, of Haddington, who wrote an interesting newspaper article on the breed at the time of the last Newcastle Show (1887), is strongly of opinion that no such crossing took place. He argues, from the fact that in 1798 Mr. Robertson, of Lady Kirk, gave 400 guineas for a Border Leicester ram, and other breeders gave high prices, that the

sheep could not have been "cross-bred." In answer, also, to the argument that the Border Leicesters must have got their pure white faces and legs from the Cheviots, Mr. Wood—in a letter to the present writer—contends ingeniously that "in all old books Bakewell's Leicesters are described as having white faces and legs," while it is known that "a large proportion of Cheviots, about forty or fifty years ago, had brown-grey faces and legs." The point, though interesting, may well be left to the breeders to decide. At any rate, the purity of the Border Leicesters has not been challenged within any period which could affect their character now.

Naturally, it is at the Northern Shows of the Society that this breed is seen at its best. The Report¹ of the Stewards on the Newcastle Show of 1864 contains the following interesting passage:—

"This class of sheep (Border Leicesters) has been coming into repute for some years past with the English flockmasters, many of whom attend the great Kelso ram sale in September. . . . The Border type is so marked that the Judges at once disqualified two English Leicesters which were entered in the ram class. The black spots which are discernible about the head and ears of so many of them tell of their descent from the old Teeswaters."

The demand for sheep of this breed is not less now than it was five-and-twenty years ago, and high prices are made by the leading ram-breeders, among whom Lord Polwarth occupies a position of eminence, by virtue of the ancient establishment of his flock and the persistency with which it maintains its place at the head of the yearly price-lists.

The display at Windsor—mustering, as it did, only thirty-one entries—was smaller than that made by some breeds of much less fame, but it contained some very fine specimens of the breed. Whatever may be disputed in their history, there can be no question as to their present close affinity to the Leicesters in type and character. The prizes went to the Right Hon. A. J. Balfour, Messrs. Samuel Jack and John Twentyman, and the executors of the late A. R. Melvin.

The Judges report very concisely:—

Report of the Judges of Border Leicester Sheep.

[Classes 161 to 164.]

The Judges consider the Border Leicester a fair Class upon the whole.

GEORGE TORRANCE.

JOHN DAVISON.

¹ Journal, Vol. XXV. 1st Series (1864), p. 445.

OXFORD DOWNS.

The rise and progress of the Oxfordshire Downs—or, as they are now generally called, “Oxford Downs”—is practically contemporaneous with that of the Royal Agricultural Society. It was only just previous to the first Oxford Show that a few enterprising breeders set deliberately to work to found a breed which should combine the weight and wool of the Long-wool with the quality of the Short-wool. The primary elements, so to speak, of the combination were the improved Leicester and the Southdown, and in one case at least—that of Mr. Charles Howard—these were the two breeds actually used. In other instances, however, the Cotswold, and the variety of the Down sheep then coming into repute as Hampshires, were employed. Of the success of the bold attempt it is not needful here to speak. The establishment of an Association and the publication of a Flock-book attest the present vitality of the Oxford Downs, while the excellence which they have achieved has seldom been better exemplified than it was in the Windsor Showyard.

There were eighty-two entries at Windsor, and the thirty-seven shearlings were a troublesome lot to judge—being as level and good a class as the breed probably has ever turned out. The Oxford Downs have attained to a general uniformity of type, the dark-brown face and legs, the symmetry of the body, good leg of mutton, short, well-placed legs, and bold head and neck, being characteristic of almost all the sheep alike. The Judges specially praise the shearling ewes, about which they remark that they were the best lot ever exhibited. The prizes were pretty evenly divided. Mr. A. F. Milton Druce came out easily first, winning the Champion Prize offered by the Oxford Down Sheep-breeders’ Association, as well as two Firsts, a Second, and three Reserve Numbers to boot. The other prize-winners were Messrs. Charles Hobbs, Albert Brassey, Frederic Street, John Treadwell, William Arkell, Robert W. Hobbs, and Baron Ferdinand de Rothschild.

Report of the Judges of Oxford Down Sheep.

[Classes 173 to 176.]

The Oxford Down Classes were well represented, and do great credit to the breeders.

In the Class of *Shearling Rams* there are a great many grand sheep.

The Class of *Shearling Ewes* is the largest and best ever exhibited.

HENRY OVERMAN.

JOHN BRYAN.

SHROPSHIRES.

The date of the establishment of the Shropshires is indefinite, inasmuch as it originated from the improvement of a native stock—the Morfe Common breed. The Longmynd of Shropshire and the Cannock Chase breed of Staffordshire were also some of the elements which went to form the improved breed. Mr. Samuel Meire is commonly cited as the pioneer of the modern Shropshire. He set to work to improve the sheep of the district in the most direct and certain way. He obtained some Southdown rams from Mr. Ellman, of Glynde, and with great judgment introduced also a cross of Leicester blood. Speaking at a local farmers' club meeting, Mr. J. Meire (as quoted by Mr. Spooner) said, "The original breed was horned, and the first attempt at improvement was to get rid of these incumbrances; and there is little doubt that this was effected by a cross of the Southdown. This sheep was well adapted for the Downs, but for the enclosures of Shropshire something more docile was required; consequently recourse was had to the Leicester." In due time the standard aimed at was attained, and any further crossing was rendered unnecessary by careful selection.

Shropshires were first honoured by the provision of separate classes at the Royal Show held at Canterbury in 1860, and since that time they have always formed a large and important section of the show of sheep. Indeed, the wonderful enterprise of the breeders and the numbers which they send for exhibition are the admiration of all show-goers. At the Wolverhampton Show in 1871 there were no less than 528 animals in the Shropshire Classes. Sir Jacob Wilson, in his report as Senior Steward,¹ remarked that "This breed of sheep is rapidly extending its usefulness throughout the country, for to my mind there is no better 'rent-paying' sheep in existence, and I rejoiced to see them forming the chief and prominent feature in the Wolverhampton Showyard." At the Oxford Show in the previous year a standard for judging Shropshires had been, with much wisdom and foresight, adopted by the Judges, and at their recommendation agreed upon by the breeders. It was as follows:—
"1. That a Shropshire sheep should possess great depth of firm flesh, indicated by a good muscular neck, straight and wide back, with ribs well sprung, and a heavy leg of mutton. 2. That the face and legs should be of a uniformly dark colour, and well-covered head; the fleece thick-set and free from grey."²

¹ *Journal*, Vol. VII. 2nd Series (1871), p. 601.

² *Ibid.* Vol. VI. (1870), p. 561.

In 1883 a Shropshire Sheep-breeders' Association was established, having for its primary object the publication of a Flock-book. This work, which has since appeared annually, was the first of its kind issued in this country.

That the Shropshires were the most numerously represented class of sheep at Windsor goes almost without saying. The number of entries was 212, or only thirty-four less than at Shrewsbury in 1884, when they were in their native county. The entries were, indeed, so numerous that the Council found it necessary to appoint two sets of Judges—one for the rams and the second for the ewes.

Report of the Judges of Shropshire Rams.

[Classes 177 to 179.]

The breeders of Shropshire sheep came out in great number and fine form at Windsor, the entries showing the unprecedented total of 212.

CLASS 177—*Two-shear Rams*—contained 26 entries of two-shear rams, four only being absent. No. 2896, belonging to the veteran breeder Mr. Thomas Mansell, was placed FIRST, afterwards taking the Shropshire Sheep Breeders' GOLD MEDAL for the best Shropshire ram exhibited. No. 2897, from Hertfordshire (Mr. A. G. Lucas), was SECOND, and No. 2879, from Forfarshire (Mr. D. Buttar), was THIRD. No. 2887, from Cambridge-shire (Mr. Grimwood Cooke), was the RESERVE NUMBER, and Nos. 2881 and 2883 were HIGHLY COMMENDED. Nos. 2885, 2890, 2894, 2895, and 2903 were COMMENDED. Altogether an excellent Class.

CLASS 178—*Shearling Rams*—contained no fewer than 110 entries, the property of 38 different breeders, beating the record as to numbers. No. 2919 (Mr. A. E. Mansell) was awarded FIRST PRIZE. No. 2921 (Mr. Joseph Beach) was SECOND, an animal with a good coat and firm flesh, though not quite true in his hind legs. No. 2966 (Mrs. Barrs) was THIRD; good quality, with an excellent leg of mutton. No. 2934 (Mr. Naper, Ireland) had the RESERVE NUMBER and was HIGHLY COMMENDED. The Highly Commended cards were bestowed upon 14 animals, and the Commended cards upon 16.

CLASS 179—*Ram Lambs*—contained 28 entries, but being so early in the season did not contain any animals of special merit. No. 3014 (Mr. Grimwood Cooke) was FIRST, with three short-legged lambs with good coats. No. 3026 (Messrs. T. and S. Bradburne) was SECOND, wool not perfect, while No. 3033 (Mr. Pulley) was THIRD, and No. 3020 (Mr. R. Thomas) was RESERVE NUMBER. Four other pens were Highly Commended, and one Commended.

We congratulate Shropshire breeders on the important display made by them, and the increasing popularity of the breed, not only in this country but in foreign parts.

CHARLES R. KEELING,
P. A. EVANS.

Report of the Judges of Shropshire Ewes.

CLASS 180. *Pen of Three Shearling Ewes*.—This Class contains 48 entries, of which 20 pens have Prizes and Commendations. Upon the whole the Class is particularly good, and does great credit to the breed.

The sheep throughout possess true Shropshire type, and are exceptionally good in their wool. The competition between the FIRST (Mr. Graham's) and SECOND (Mr. Farmer's) PRIZE pens was very close, both pens being exceedingly good—in fact, it is some years since we saw better specimens exhibited. The THIRD PRIZE pen (Mr. Barre's) are big useful animals, of good character and wool.

CHARLES COXON.
PETER EVERALL.

SOUTHDOWNS.

The Southdowns are the aristocrats of the sheep classes. Their pedigree is older than the peerage, for, according to Mr. Spooner, they "can trace a long line of pure descent from a period antecedent to William the Conqueror." At the latter end of the last century, John Ellman, of Glynde, did much the same for the Southdowns as Bakewell did for the Leicesters. Whether he sought improvement from the "outside" (and of this there is no definite evidence at all) or not, the improvement which he effected was very great. Nor did efforts at improvement end with him. As the Southdowns extended over the country they tended towards somewhat diverse types. Lord Western, writing to Lord Spencer about forty years ago,¹ said, "I look upon what is commonly called a Southdown to be now a very different animal from the little pure Southdown of fifty years ago." This tendency to differ led to a dispute which has become famous. At the Manchester Show, in 1869, Mr. T. Ellman, who was one of the Judges of Southdowns, differed from his two colleagues, and presented a lengthy report explaining the reasons for his dissent. He objected, because, in his opinion, prizes had been awarded to sheep which were untrue to type and which displayed a tendency to substitute "quantity" for "quality and form." "This," said Mr. Ellman, "is a heterodox (*sic*) which I cannot subscribe to. It is diametrically opposed to the teaching of the Bakewell school." Mr. W. Wells, who was Senior Steward of Live Stock at Manchester, and who accordingly wrote the Report,² summed up the dispute judicially by allowing that an impression certainly prevailed in the Showyard that, with respect to not a few of the sheep exhibited, there was room for criticism as regarded their lack of uniformity of character. He added, "one cannot but consider that he who watches over the sources of any of our great national breeds of stock, with, it may be, even an excess of jealousy, is fulfilling a useful part in his generation."

From the first there have been, as a matter of course,

¹ Quoted in *Journal*, Vol. X. 1st Series (1849), p. 433.

² *Journal*, Vol. V. 2nd Series (1869), p. 524.

separate Classes for Southdowns, and they have formed one of the most important and attractive sections. At Windsor they were second in point of numbers, being only excelled by the Shropshires. The number of entries was 123. The Judges give the details of their awards, but they omit to mention that Mr. Ellis's shearling ram also won the Champion Cup presented by Southdown breeders for the best ram of the breed shown.

Report of the Judges of Southdown Sheep.

[Classes 181 to 184.]

CLASS 181—*Two-shear Rams*—comprised 18 entries. The FIRST PRIZE was awarded to No. 3106, bred and exhibited by Mr. J. J. Colman, M.P., and the SECOND PRIZE to No. 3105, and the THIRD PRIZE to No. 3103, both the property of the Duke of Richmond. The RESERVE NUMBER was awarded to No. 3090, the property of H.R.H. the Prince of Wales.

It may be noted that in this Class the Judges could not quite agree as to the relative merits of the three prize sheep, and an umpire had to be called in to decide between them. Although the Class contained some useful rams, the Judges did not think the exhibits equal to their expectation.

CLASS 182—*Shearling Rams*—contained no less than 49 entries. In this Class the Judges had no hesitation in placing the ram No. 3139, the property of Mr. Edwin Ellis, at the head of his Class, Mr. J. J. Colman's ram, No. 3150, taking the SECOND PRIZE. The THIRD PRIZE was awarded to No. 3108, bred and exhibited by H.R.H. the Prince of Wales. The RESERVE NUMBER was awarded to ram No. 3127, exhibited by Mr. A. Heasman.

There were many excellent rams in the Class, some of which might have stood higher in the awards had it not been for the inferior quality of their wool.

CLASS 183. *Three Ram Lambs.*—There were 22 entries. The FIRST PRIZE was awarded to pen No. 3180, the property of Mr. J. J. Colman, M.P.; the SECOND PRIZE to No. 3176, belonging to Mr. Edwin Ellis; and the THIRD PRIZE to pen No. 3167, exhibited by Mr. William Toop.

As a whole, the Judges regret that the Class of Ram Lambs was not so good as they hoped to have seen.

CLASS 184—*Shearling Ewes*—comprised 32 entries. The FIRST PRIZE was awarded to pen 3209, the property of Mr. J. J. Colman, M.P., the SECOND PRIZE going to pen No. 3204, exhibited by Mr. Edwin Ellis, and the THIRD PRIZE to No. 3211, the property of Mr. Charles Thomas Lucas. The RESERVE NUMBER was awarded to pen No. 3203, exhibited by Mr. Edwin Ellis.

The class for Shearling Ewes contained pens of animals of very considerable merit, and the Judges thought them the "cream" of the Southdown Classes.

HENRY WOODS.
HUGH PENFOLD.

HAMPSHIRE DOWNS.

We might without much inaccuracy divide British sheep broadly into three varieties. There are breeds which have survived, breeds which have developed, and breeds which have

been made. The Hampshire Downs are a prominent instance of a breed which has been developed. The old Wiltshire horned sheep and the Berkshire Knot were improved by crossing with the Southdowns about the beginning of the century. It so happened, however, that two diverse views obtained, and from 1815 to 1835 Hampshire Downs of the north of Hants and the south of Wilts were totally dissimilar in character. About 1845, according to Mr. E. P. Squarey,¹ when the Hampshire Downs were gradually asserting their superiority over the Southdowns in the counties of Wilts, Hants, and Dorset, the necessity for an improvement in the general quality and tendency to make flesh was apparent. In the hands of a few skilful breeders these qualities were developed, and with so much success that the breed has now for many years held a position of supremacy in the matter of early maturity. As now established, the Hampshires differ markedly from other varieties of Down sheep. They are bigger and more upstanding than the Southdowns, while of late years there has been a great improvement in the symmetry of the barrel, and a development of greater thickness through the heart and more evenness on top. They retain the blackness of face and legs, the "Roman" profile, and the "sourness" of the head which characterise the breed and indicate its origin. These points are, indeed, much prized by the breeders, who justly pride themselves on the increasing popularity of the breed.

Hampshire Downs made their first distinctive appearance at a Royal Show in 1857, when prizes were offered for them by the Salisbury Local Committee. At Windsor there were seventy-eight entries, and the display, as the Judges remark, was one of exceptional merit. The prizes were won by Messrs. Robert Coles, Frank R. Moore, T. F. Buxton, and Joshua East, and the Downton College of Agriculture.

Report of the Judges of Hampshire Down Sheep.

[Classes 185 to 188.]

The show of Hampshire Sheep was an exceedingly good one, larger in numbers and better in quality than has ever been seen at the "Royal."

CLASS 185. *Two-shear Rams*.—Though they did not come up to the Shearlings and Ram Lamb Classes in numbers, they included a few animals of rare merit, notably the FIRST (Mr. Coles's) and SECOND (Mr. Moore's) PRIZE winners.

CLASS 186—*Shearling Rams*—was a very large and exceptionally good Class, containing 21 exhibits, nearly the whole of which were of great merit; the Prize winners have rarely been equalled, and never excelled.

CLASS 187—*Pen of Three Ram Lambs*—for which the Hampshire Downs

are so justly noted, contained 28 pens, and the Judges had great difficulty in making their awards, the whole Class being of such great excellence, as was shown by the number of Highly Commended and Commended animals.

CLASS 188. *Pen of Three Shearling Ewes.*—The same remark applies to the Shearling Ewe Class, which contained ten entries.

JOSEPH CARPENTER.

WILLIAM NEWTON.

SUFFOLKS.

The recent rise to fame of the Suffolk breed of sheep suffices to prove that, in spite of the excellences of established varieties, there is still plenty of room for others if they prove themselves possessed of the necessary merit. The history of the Suffolks is not unlike that of the Hampshires—a breed which they in other respects somewhat resemble. The parent stock was the old Norfolk sheep. In Mr. Raynbird's report on the farming of Suffolk, published in the *Journal* in 1847,¹ he remarks on the improvement in sheep then in progress. "The restless Norfolk," he says, "is now rarely seen, their place being taken by the Southdown, or by the cross between that breed and the old Norfolk—a breed equally hardy, with greater fattening properties than the Norfolk." It was from this cross and by means of careful selection that the present Suffolks were developed, and, under the fostering care of a Flock-book Association established in 1887, they have lately shown marked improvement in public form. They made a good display at the Norwich Show in 1886, and have since that year had distinct Classes provided for them.

There were thirty-five entries of Suffolks at Windsor, and the Judges refer to the improvement in character and uniformity which was generally remarked. The Champion Prize, offered by the Suffolk Sheep Society, was won by Mr. E. Gittus, and the other prize-winners were the Marquis of Bristol and Messrs. Joseph Smith and Walter Whitlock.

Report of the Judges of Suffolk Sheep.

[Classes 189 to 192.]

These Classes were fairly filled with sheep of a much improved type, showing greater uniformity of character than we have noticed at previous exhibitions. The ram lambs especially were deserving of this remark: The ewes were well represented, numbering 24. The Judges are, however, of opinion that these animals were exhibited in too high condition for the purpose they are intended for.

JOHN READ.

WILLIAM HARVEY.

¹ *Journal*, Vol. VIII. 1st Series (1847), p. 308.

SOMERSET AND DORSET HORNED.

The Dorset horn sheep are one of the oldest breeds in the kingdom, having been naturalised in their native county from time immemorial and preserved practically unmixed. They have, however, been greatly improved in size, shape, and fleece during the past fifty years. They are one of the breeds which have lost some of their ancient prestige. At one time they occupied the greater part of the chalk district, but after a lengthy struggle for supremacy they had to retire before the Southdowns, which were more suited to range the hills. They hold a unique position by reason of their peculiar aptitude for breeding at all seasons. This causes them to be used to a certain extent, not only in their own county, but in other parts, to supply lamb for market at Christmas and other unseasonable times. The ordinary practice, however, is for the ewes to lamb between the middle of December and the middle of January.

There were thirty-one entries of this breed at Windsor, all of them coming from Somerset. Four breeders, Messrs. J. Kidner, Herbert Farthing, Samuel Kidner, and W. T. Culverwell, divided the prizes.

DEVON LONG-WOOLS.

Professor Low, writing forty-five years ago, remarked that the Devonshire breeders "take a just pride in their newly-formed breed." This new breed was the result of crossing the old Bampton Notts—a large white-faced breed with a heavy fleece—with the improved Leicester, and it has now become well established under the name of Devon Long-wools. Selection has long since taken the place of crossing as the method of improvement. Mr.—now Sir Thomas—Acland, in his report on the farming of Somerset,¹ remarks that at that time (1850) it was considered that there could not be a better sheep for the purpose of the farmers of the rich lands than the improved Bampton crossed with Leicester. Since that time the Devon Long-wools have become still more firmly established as the type has become fixed.

There were thirty-one entries at Windsor, and the prizes went to Sir J. H. Heathcoat-Amory, Messrs. Charles Norris, Nathaniel Cook, and C. G. Thorne.

RYELANDS.

One of the most ancient of native breeds is the Ryeland, which is indigenous to the Welsh marshes, and especially to

¹ Journal, Vol. XI. 1st Series (1850), p. 682.

certain sandy tracts (whence its name) formerly devoted to the production of rye, situated to the south of the river Wye. The wool of this breed was long considered the finest produced in the British Isles—a character, indeed, which it might even yet merit. Its mutton, too, is of excellent quality and flavour. Its diminutive size, however, and its deficiency in economical value when compared with other improved breeds, have led to its decrease in favour. At the Worcester Show in 1863 the Stewards reported that “the Ryeland sheep shown on this occasion were a very good specimen of a breed now almost extinct, but which were formerly in great favour in Hereford.”

At Windsor fifteen entries—representing only two flocks—were made, and all the prizes were won by Mr. Frank Shepherd.

DARTMOORS AND EXMOORS.

The fair county of Devon has the unusual honour of supporting four distinct breeds of sheep—the Exmoors in the north, the Devon Long-wools and South Devons in the south, and the Dartmoors in the middle. Both Exmoors and Dartmoors are among the few survivors of the forest and mountain breeds which once ranged over the greater part of the country. Except that the Exmoors are the smaller, there is a good deal of family likeness in the two breeds. Both have been very much improved during the past half-century. Attempts have been made to supplant them, but both breeds continue to hold their own as best suited to their native districts. In the Report on the Battersea Show of 1862¹ it was noted that few sheep had been more improved than the Exmoors during the previous thirty years.

There were twelve entries of Dartmoors and twenty of Exmoors at Windsor. Messrs. James Drew and J. and I. B. Yelland took the prizes for the former, and Lord Poltimore, Sir William Williams, Mr. E. J. Stanley, M.P., and Mr. John Jones for the latter.

Report of the Judges of Somerset and Dorset Horned (Classes 193 to 196), Devon Long-wool (Classes 200 to 202), Ryeland (Classes 203 to 205), Dartmoor (Classes 206 to 208), and Exmoor Sheep (Classes 209 to 211).

SOMERSET AND DORSET HORNED.

CLASS 193. *Rams Two-shear and upwards.*—Fairly represented.

CLASS 194. *Shearling Rams.*—Very good Class, well represented, the two leading Prizes possessing great merit.

¹ Journal, Vol. XXIII. 1st Series (1862), p. 392.

CLASS 195. *Pen of Three Ram Lambs*.—Also good Class, the FIRST PRIZE, No. 3341 [Mr. W. T. Culverwell], showing in their heads and general character the great merit of the breed.

CLASS 196. *Pen of Three Shearling Ewes*.—This Class of shearling ewes is the best we remember ever to have seen, the three Prize pens showing exceptional merit.

DEVON LONG-WOOL.

CLASS 200. *Rams Two-shear and Upwards*.—Strong Class, well represented, many good specimens of the breed, the FIRST PRIZE, No. 3393 (Mr. Charles Norris), being a smart, active sheep of good quality, and, we are pleased to say, not overfed.

CLASS 201. *Shearling Rams*.—Strong, good Class, the Prize winners having good type and character.

CLASS 202. *Pen of Three Shearling Ewes*.—Fewer entries, the FIRST PRIZE pen being exceptionally good, and the whole Class Commended.

RYELAND.

CLASSES 203 to 205.—These Classes were not strongly represented, but the animals exhibited were particularly good.

DARTMOOR.

CLASSES 206 to 208.—Many good sheep in these Classes, showing great hardihood and constitution, being well adapted for the climate in which they are located.

EXMOOR.

CLASSES 209 to 211.—These smart little mountain sheep took the fancy of the Judges, and the Classes were better represented than usual; the rams in both Classes which took honours showed great quality and symmetry, while the FIRST PRIZE pen of shearling ewes, No. 3465 (Lord Poltimore), were perfect models of the breed.

GEORGE LORAM.

HENRY MAYO.

RICHARD JOHN STRANGER.

KENTISH OR ROMNEY MARSH.

The bleak flats of the south-eastern corner of the country produce a class of sheep which is eminently adapted to its circumstances. Like the other marsh breed, the Lincolns, Kentish sheep are big-framed and heavy-woolled, though neither in weight nor wool do they quite equal the Lincolns. The introduction of the Leicester was for a long time strenuously resisted by the Kentish breeders, but eventually the obvious advantages of the improved breed were admitted, and a dash of Leicester blood was generally used, to the considerable improvement of the old stock. Having thus secured a greater aptitude to fatten, the breeders generally relinquished extraneous help, and for many years past have relied solely on careful selection.

There were thirty-six entries at Windsor, and the prize-

winners were Lord Hothfield, Messrs. Henry Rigden, Henry Page, and Thomas Wotton.

ANY OTHER BREED.

The fact that the same Judges were allotted to the Romney Marsh and to the "Any other Breed" Classes renders it convenient to take these sections together here.

There was a remarkable collection of all sorts and conditions of sheep in these two Classes, and the Judges—as their report reveals—were obviously (and pardonably) puzzled in dealing with them. They awarded all the prizes to some South Devons—big, useful-looking sheep—sent by Mr. James Stooke. They were certainly, from an ordinary sheep-farmer's point of view, the best-looking entries in the section. The most interesting, however, were the little black four-horned St. Kilda sheep, which, as ovine curiosities, aroused much attention. Lord Moreton, who keeps a number of these sheep, has kindly sent the following notes respecting them:—

"The black-horned St. Kilda sheep are said to be the descendants of some sheep that got ashore from an Armada ship that was wrecked on the island. Whether there is any truth in this tradition it would probably be now impossible to discover. The late Mr. Staniforth had quite a number of them at Storrs; they were sold at his death and got spread about England. Although my sheep have probably been bred for several generations in England, they are still inclined to be wild. As far as I can make out, the first pair of horns begins to show some time before the second. At Mr. Staniforth's sale I saw a ram sold for £6 that had three pairs of horns. I find the mutton excellent, though of course the joints are small. I get three to four pounds of wool off my sheep, and the wool is of good quality. As a matter of fact, although they are called black sheep, they are really brown. Of course, they cannot compete in an economic point of view with our improved breeds, but at the same time they are very ornamental additions to a park, and are very far from useless, as any one would allow who tasted the mutton."

Several Merinos were exhibited in these two Classes. Some had been bred in Britain and some in the Antipodes, but they served mainly to illustrate the failure of this famous breed to acclimatise itself in this country. When the Society was founded, there were still many who believed that the introduction of the Merino was for sheep-breeders a short cut to prosperity. The belief in the Merino is one of the traditions which the Society has seen die. Indeed, by its omission to assist in its

prize list, or by other means, the Merino movement, the Society may be said to have assisted in burying this particular idea.

One or two Portland sheep were shown. This is a smaller tribe of the Dorset Horn breed, and has been kept unmixed on the isle of Portland from time immemorial.

Report of the Judges of Kentish or Romney Marsh and "Any other Breed" of Sheep.

KENTISH OR ROMNEY MARSH SHEEP. [Classes 197 to 199.]

This useful and hardy Class is hardly up to its usual standard.

"ANY OTHER BREED." [Classes 236 and 237.]

The South Devons far surpass everything else in this Class. It occurs to us that a separate Class might be formed. As to the others, it is very difficult to form any opinion, as the type is so different.

ROBERT L. COBB.
G. WEBB.

HERDWICKS, LONKS, &C.

The Herdwicks are generally agreed to be an alien race. Two traditions of their accidental importation are current. The most picturesque, and consequently the most popular, is that a ship from the Spanish Armada was wrecked on the Cumberland coast, and that the sheep which were the parents of this breed were cast ashore. The other variant of the tradition is that the wreck took place early in the last century, and that the sheep on board the ship came from Scotland. Mr. Rowlandson, again, writing in 1849 in the *Journal*,¹ expressed the opinion that the Herdwicks were a Welsh breed. This opinion is, however, quite unsupported, and, whether we accept the Armada assumption or no, there is little doubt that the story of the shipwrecked sheep has a basis of truth. Whatever the date of their introduction, they spread rapidly, although the first proprietors endeavoured to create a monopoly by forming an association somewhat similar to that of the Dishley breeders. They soon superseded the old Fell breed, which was a white-faced horned sheep. In 1866, when Mr. Dixon wrote about them in the *Journal*,² they covered Cumberland, Westmoreland, and part of Lancashire, and he referred to the improvement which had been effected in them and to their growing popularity. The publication of that essay, as a Herdwick breeder writing in the *Live Stock Journal Almanack* bears testimony, "did much to make the breed known." The Judges of Herdwicks at the Liverpool Show in 1877 reported that

¹ *Journal*, Vol. X. 1st Series (1849), p. 440.

² *Journal*, Vol. II. 2nd Series (1866), p. 363.

"this hardy mountain sheep has much improved of late years. Instead of, as formerly, seeing sheep nearly all hair, and that not of a good colour, we had to-day a good hardy sheep, growing fair good wool, with but little hair, and not much of it dark-coloured." Herdwicks made their first appearance in a Royal Showyard at Carlisle in 1855. At Windsor there were thirty-three entries. The Champion Prize offered by the Lord Mayor of London was won by the representatives of the late Hugh P. Holme, other prize-winners being Messrs. Tom Newby, H. C. Howard, J. Spencer, and J. Rothery.

The huge Lonks had their earliest home in the hill ranges of Yorkshire and Lancashire, to which they were probably indigenous. They seem to have affinity to the black-faced breed of the Scotch mountains. There was a good show of Lonks at Battersea in 1862, and again at Worcester in 1863. It was said of them at the latter Show that "if the Lonks be as hardy as they are good they must be the most valuable sheep for the hills that we have at present." As their hardiness is beyond dispute, this was high praise. At Windsor the entries of this breed were seventeen, but the prizes were well divided. Messrs. Walton Bros., William Walsh, Mitchell Dearden, and J. Blackburn, and Mrs. W. C. Dawson, were the winners.

The Judges did not think very highly of the nineteen entries of the blue-faced breed of the Yorkshire wolds. The prizes in the Wensleydale Classes went to Messrs. John Heugh, Frank Heugh, William Lamb, and T. F. King.

The Limestone sheep are, like the Lonks, probably akin to the Black-faces, notwithstanding their present colour. Only ten entries were made, but they made a good representation of the breed, the prize-winners (and only exhibitors) being Messrs. T. A. Cornthwaite, Rowland Parker, and Isaac Barrow.

Report of the Judges of Wensleydale (Classes 212 to 214), Limestone (Classes 218 to 220), Herdwick (Classes 227 to 229), and Lonk Sheep (Classes 230 to 232).

WENSLEYDALE.

CLASS 212. *Rams Two-shear and upwards.*—With regard to this Class we are sorry to inform the Council that it was only inferior and much below our expectations.

CLASS 213—*Shearling Rams*—were also *very* inferior.

CLASS 214—*Shearling Ewes*—were of a far better type.

LIMESTONE.

CLASSES 218 and 219—*Rams*—were very good, and we quite agreed that a Third Prize should be given in Class 219.

CLASS 220. *Shearling Ewes.*—These were also good, and we also awarded a Third Prize.

HERDWICK.

CLASS 227. *Rams Two-shear and upwards*.—This Class we considered the best that was ever shown at the “Royal” in our own experience. The FIRST PRIZE and CHAMPION PRIZE, No. 3574 (Representatives of the late Mr. H. P. Holme), is a marvel of the breed. The SECOND, No. 3577 (Mr. James Spencer), a good type, and we almost think that had he not met with an accident to his foot in the train he might have succeeded in coming to the front.

CLASS 228.—*Shearling Rams*—were also very good and well-deserving.

CLASS 229. *Shearling Ewes*.—This Class was extremely good, and we were sorry not to be able to give them more prizes than we had power to allot. Not an inferior sheep in the Class.

LONK.

CLASS 230. *Rams Two-shear and upwards*.—This Class was good altogether, and we felt justified in awarding a Third Prize.

CLASS 231. *Shearling Rams*.—This Class was equal to the Aged Class; in fact, the whole of them were very good.

CLASS 232. *Shearling Ewes*.—This Class is the very best, though small in number, that has been shown for some time. We were bound to award a Third Prize in this Class also.

JOHN INGLEBY.

JOHN WILSON.

JOHN IRVING.

ROSCOMMONS.

When George Culley wrote his work on British live-stock at the beginning of the century he made some severely ironical observations about Irish sheep. At that time, however, it was only by smuggling from England that any improved sheep could be obtained. The Connaught breeders were among the earliest to adopt this practice, and when the restrictions on importation were removed the farmers of Roscommon were especially vigorous in improving their sheep. According to the late R. O. Pringle, it is only within the past five-and-twenty to thirty years that this systematic improvement has been carried on—chiefly by the introduction of Leicester blood and subsequent selection—which has resulted in the present breed of improved Roscommon sheep. There were fourteen entries in these classes at Windsor, Major Balfe taking all but one of the prizes, the odd honour going to Mr. R. Flynn.

Report of the Judges of Roscommon Sheep.

[Classes 215 to 217.]

There were not many entries in this Class, owing we presume to the distance they had to be sent. Nos. 3491, 3492, and 3493 (the property of Major Balfe) were very fine big sheep with a good deal of quality. We believe the Class will be largely represented at the next Show, as Plymouth is a port more easily reached from Ireland than is London.

JAMES GLANCEY.

JOHN DAVISON.

GEORGE TORRANCE.

CHEVIOTS.

Cheviot sheep have been found on the Cheviot Hills from time immemorial, and are well suited to that situation. The native sheep of the hills was greatly improved rather more than a century ago, when Mr. Robson did for the Cheviots very much what Bakewell did for the Leicesters. It is still a moot point as to the particular elements which he employed, one account saying that it was the Lincolns, and another the Leicesters. The probability is that he used Dishley Leicesters when they were in a state of transition, and before they attained their ultimate perfection. In any case his work of improvement was done with much judgment and discretion, and the Cheviots have greatly extended their range in consequence. In general shape the Cheviot rather resembles the Border Leicester, but, according to Mr. John Usher, "compared with the Leicester, he is as a cavalier to an alderman."

It was noteworthy that here and there among the twenty-seven entries of Cheviots at Windsor one saw a horned sheep, the majority lacking that distinction. Mr. Dixon, in his essay on the "Mountain Breeds,"¹ says that "the horned tups are thought more hardy, though they are often coarser in the coat." The prize-winners were Messrs. John Robson, Jacob Robson, R. W. Laidley, Walter Mundell, David Hall, and Edward Dodd.

Report of the Judges of Cheviot Sheep.

[Classes 221 to 223.]

The Judges of Cheviot sheep have to remark the great pleasure they had in judging a Class of sheep of very superior merits.

GEO. REA.
THOMAS ELLIOT.

BLACK-FACED MOUNTAIN.

This breed shares with the Cheviots the sheep supremacy of Scotland. Professor Low supposes that this breed found its way from the mountains of the north of England into Scotland, and there is a tradition that they were introduced to Ettrick Forest by one of the early Scotch kings, though the "foreign land" from whence he obtained them is indeterminate. As a matter of fact, however, the most natural hypothesis seems to be that the Black-faces were developed from the aboriginal breed of the Scotch hills, which gradually improved and increased in size. It was in the course of the eighteenth century that the improvement in the sheep stock took place, and the Black-faces generally

¹ Journal, Vol. II. 2nd Series (1866), p. 361.

supplanted their progenitors known as the "Dun-faces." They spread throughout the Highlands, and, indeed, the greater part of Scotland. During the past fifty or sixty years, however, the Cheviots challenged the Black-faces, and ousted them to some extent, especially on the west coast. The bad winters of the years 1866-76—according to a writer in Coleman's book on British sheep—tended to reverse the process, and to reinstate the hardier Black-faces.

There were twenty-six entries at Windsor, the prize-winners being Professor McCracken, Messrs. William Walsh, John Archibald, and R. Sinclair Scott.

Report of the Judges of Black-Faced Mountain Sheep.

[Classes 224 to 226.]

The all-aged Class of black-faced rams, though few in number, were of high class merit—the FIRST PRIZE sheep, No. 3548 (Mr. John Archibald), confirming the estimate made of him at Newcastle, where he was second as a dinmont. The SECOND PRIZE sheep, No. 3547 (Mr. John Archibald), is of great merit also, and the THIRD PRIZE sheep, No. 3550 (Mr. R. Sinclair Scott), has proved his quality in several showyards in Scotland this year.

The dinmonts are a good Class, and the First Prize gimmers are of good promise and will grow into very nice ewes.

ROBERT PATERSON.
ROBT. GREENSHIELDS.

WELSH MOUNTAIN.

The small ancient breed of the Welsh Mountains was at one time, as Mr. Morgan Evans remarks, the only sheep stock on hill and plain from Anglesea to the Bristol Channel, from the Severn to Cardigan Bay. As agriculture in the principality improved, the larger English breeds, such as the Leicesters or Cotswolds, and later the Shropshires and Oxford Downs, were introduced in the lowlands and on the better-cultivated farms, while on the poorer soils and upland holdings crosses between these and the native sheep were extensively adopted. Thus the Mountain sheep were banished chiefly to the higher ranges, where they remain very largely in their pristine purity, and in practically unchallenged possession. Several attempts have been made to substitute other mountain breeds, such as the Cheviot, but, as might be expected, no other is found so suitable as that which is indigenous to the hills.

The collection of this breed at Windsor comprised, as the Judges point out, some which did not seem true to type, but the prize sheep were very perfect. There were thirty-four entries, and the prizes were won by Messrs. John Jones, Godfrey Parry, and Owen Price.

Report of the Judges of Welsh Mountain Sheep.

[Classes 233 to 235.]

There was a large entry of sheep in these Classes, varying much in character. We had considerable difficulty in satisfying ourselves in some cases as to pureness of breed. The First Prize animals in each Class are excellent specimens of the Welsh Mountain sheep, active, hardy, and thick-fleshed, carrying a good close fleece.

W. B. ROBERTS.

JOHN WILLIAMS.

GOATS.

Exactly ten years have elapsed since the Kilburn Meeting in 1879, when for the first time prizes for goats were offered by this Society. At that date goat showing was in its infancy, and comparatively few persons were interested in the breeding of these animals. The total number of entries was thirty-two, the Classes being divided into Short-haired British, Long-haired British, and Foreign Goats. In the interval that has elapsed great strides have been made in goat breeding, and these animals have increased considerably in popularity. A Goat Society, the proposed formation of which was first whispered at Kilburn, has been established, a Herd-book has been introduced, and as much care and judgment are now exercised in the selection of breeding stock, especially in regard to milking pedigrees, as is the case with cattle. Considering these facts, it was reasonably supposed that, taken all round, the exhibits in the Goat Classes at Windsor would be greatly superior to those at Kilburn, both in numbers and quality; but, strange to say, this improvement was not, in the opinion of competent Judges, manifest throughout the classes to the extent that was expected, considering the advance witnessed at other Shows, nor were the entries proportionate in number to the improved classification.

Mr. Holmes Pegler, the Honorary Secretary of the British Goat Society, ascribes the want of general improvement to the fact that "In 1879 all who sent entries were regular exhibitors who had been engaged for some years in improving the breeds, whereas at Windsor, of the fourteen different owners five or six were comparative strangers to goat showing, and the twelve or thirteen entries they contributed did not belong to the improved short-haired type which finds favour at the present day. They were mostly Irish and Welsh goats, with long hair, long, pointed horns, and flat sides; elegant creatures, perhaps, and attractive enough when viewed from a distance, standing on some high peak or rocky eminence amongst their native mountains, but decidedly at a discount at shows. Although the winners were not (with one or two exceptions where there was practically no

competition) of this description, but, on the contrary, the pick of the prize-takers of the year, there was a sufficient proportion of the rough element to mar the uniform improvement in the whole, and to justify the opening remarks of the Judges in their report."

There were, nevertheless, special features in connection with this department at Windsor which raised it in importance above every other goat show yet held. This was mainly due to the patronage bestowed on the Goat Classes by Her Majesty the Queen, and to some interesting exhibits appertaining to goat culture collected on the stand of the British Goat Society. Here were displayed specimens of mohair from Angora goats in various parts of the world, with samples of dress materials into which mohair largely enters; goatskins from the Cape and the Levant, dressed as mats or tanned into "morocco" leather; specimens of goats' cheese from Germany; butter made from goats' milk; and other minor details. The chief attraction consisted, however, in two Cashmere shawls, one presented to the Queen by the Maharajah of Cashmere, which had been sent by Her Majesty's commands from Osborne for this Show; and the other a shawl of English manufacture, made as an experiment in 1828 from the combings of a herd of cashmeres imported into England some five years later, and from which the Queen's goats are descended. This shawl, together with a gold medal awarded for it by the Society of Arts in 1828, were the property of Mr. C. J. H. Tower, of Weald Hall, Essex, and were inspected by Her Majesty at the close of the Show.

Report of the Judges of Goats.

[Classes 238 to 243.]

We regret we cannot congratulate the Royal Agricultural Society on the exhibits of goats generally, as there were so many with long hair, which we consider a decided objection; but at the same time there is a marked improvement in the short-haired variety since the Kilburn Show, which, we believe, was the last time the Royal Agricultural Society had classes for goats.

With a view of supplying a report that may be of some use to exhibitors, we append the following notes from our judging books.

CLASS 238. *Hornless Males*.—We must certainly congratulate the exhibitor of No. 3677 (Mr. Paul Thomas's *Zampa*)—a Toggenburg (Swiss)—who won easily the FIRST PRIZE in the Class, also winning the British Goat Society's SILVER MEDAL for best male in Show. The goat was a remarkably fine short-haired animal, combining height, length of body, and substance, being also deep round the loins, where most he-goats fail. SECOND PRIZE, No. 3675 (Mr. Charles L. Jackson's *Buffalo Bill*): moderate, but showing more breed than the Reserve Number.

CLASS 239. *Horned Males*.—FIRST PRIZE, No. 3679 (Mr. Christopher J. H. Tower): a good Highland goat, with nice head and curved horns,

but with the objectionable long hair. No. 3680 (the Baroness Llanover's *Cadwaladr*), Welsh: horns too long by 18 inches, and too close together, almost meeting at the points.

CLASS 240. *Horned or Hornless Males, not exceeding two years.*—A poor Class, there being only two exhibits, one of each variety. The hornless one, No. 3683 (the Baroness Burdett-Coutts's *Garnet*), was a good deal the smaller, but showed much more breed, and, as it was ten months younger, we decided in its favour. The horned one did not fulfil the expectations formed of it when it was exhibited at the Dairy Show at Islington in October 1888.

CLASS 241. *Hornless Females.*—No. 3689 (Mr. Paul Thomas's *Brittany*), Toggenburg breed, was FIRST, having large frame, but was in poor condition, though showing good milking qualities. No. 3688 (Mr. Paul Thomas's *Galatea*), also Toggenburg breed, was SECOND. Nice quality, good body, and milking qualities, but small compared with First Prize. No. 3690, THIRD PRIZE (the Baroness Burdett-Coutts's *Duchess*): a good half-bred Nubian and British, with large udder, and deep in body. No. 3691, RESERVE and HIGHLY COMMENDED (the Baroness Burdett-Coutts's *Daphne*): has great depth, good udder, but teats too small. She had two nice female kids with her which showed careful breeding and much promise. No. 3686: very poor; moderate-sized udder. No. 3684: nice quality, but too small.

CLASS 242. *Horned Females, over two years.*—No. 3699 (Mr. A. C. McMinn's *Biddy*) was FIRST, taking also the British Goat Society's SILVER MEDAL for best female in the Show. A well-made large black goat, short-haired, with great length, and showing good milking qualities. This goat, with her sister, when exhibited a year or two ago as goatlings, were said to be the largest ever bred in this country, and they have certainly developed into very fine goats. No. 3694 (Mr. C. Sainty's *Duchess*), SECOND PRIZE: a large Irish goat; large udder and teats, but with the customary and objectionable long hair. No. 3692 (Mr. W. Cleave's *Lady of the Lake*), THIRD PRIZE: a most compact and excellently-shaped goat, though small; udder well-developed. No. 3698 (the Baroness Llanover's *Dihafal*), RESERVE NUMBER: small, but well-shaped. Probably a good milker, as she had three fine kids with her. No. 3693: very hollow back; coat and skin in rather bad condition. No. 3695: neat little goat, with good udder. No. 3701: the chief feature of this goat was its peculiar chocolate colour.

CLASS 243. *Horned or Hornless Females, not exceeding two years.*—No. 3703 (Mr. John Grunnell's *May Blossom*), FIRST PRIZE: good size, showing quality and careful breeding. No. 3708 (Mrs. McMinn's *Duchess Biddy*), SECOND: a taking goat, of a cream colour; good head, chest, and deep in body for a goat that has never given birth to a kid. No. 3706 (Mr. W. N. Higgs's *Lady Ormond*), THIRD: well-shaped, and fine quality; will probably grow into a large-sized goat. No. 3707 (the Baroness Burdett-Coutts's *Cornflower*), RESERVE and HIGHLY COMMENDED: a well-bred hornless goat, but rather short in body. No. 3705 (Mr. W. N. Higgs's *Lady Teazle*), HIGHLY COMMENDED: very similar to the Third Prize winner, but not so well-grown. No. 3702: nice goat, but probably it will not grow to sufficient size. No. 3709: out-classed. No. 3704: a very pretty pure Angora breed, that excited a great deal of interest by its comparison with our island breeds, and also with the Cashmere goats kindly exhibited (not for competition) by Her Majesty the Queen from her herd in the Great Park, Windsor.

JAS. B. SIMONDS.

W. K. TAUNTON.

BIRKBECK RAVENSCROFT.

PIGS.

One of the salient features of the past half-century, and especially of its later decades, has been the increasing agricultural importance of the pig. When the Society started, and for many years afterwards, this unattractive but useful animal appears to have been regarded rather as a necessary evil. It was not, indeed, until British agriculture had fallen upon the day of small things that the position of the pig as a possible source of profit became fully recognised, and that it rose from the status of the farm scavenger to the dignity of recognition as a money-maker.

It was not, however, that the pig was overlooked at the time of the great agricultural revolution, at the end of the last and the beginning of the present century. The pioneers of improved farming could scarcely fail to be dissatisfied with their swine, and they seem for the most part to have despaired of getting better pigs by the methods which proved so efficacious in the case of cattle and sheep. In the latter instances they remodelled their stock from their own resources, so to speak, and without any outside aid. But to improve their pigs they went abroad, and by the importation of Siamese, Chinese, Maltese, and Neapolitan breeds they improved many of the aboriginal varieties off the face of the earth. Professor Low, writing soon after the foundation of the Society, speaks of the Northampton, Shropshire, Hampshire, and Rudgwick as "former breeds" which had disappeared before the march of improvement. Of course, the best of the old varieties survived, though they most of them borrowed some good qualities from their foreign rivals. Fifty years ago the chief breeds existing were the "Yorkshire, Lincolnshire, and Norfolk" breed—now known generically as the "Large White"—the Suffolk, the Essex, and the Berkshire. Other breeds—such as the Tamworths, for instance—existed locally, but were, generally speaking, unknown, at any rate to the agricultural writers of that day. Among the "extra stock" at the first Show of the Society, in 1839, was a boar exhibited by the Rev. W. L. Rham, which was described as of "the Suffolk, Chinese, and Neapolitan cross." The prize in one of the classes was won by three pigs of a "Chinese and Oxfordshire" cross, shown by Mr. Smallbones, of Hordley.

The position occupied by the pig section in the catalogue of the first Oxford Show is indicative of the agricultural opinion of its importance at that time. Four prizes (35*l.* in all) were awarded, and one of these, as above mentioned, went to a cross-bred animal. Four years afterwards the large and small breeds

were divided, and by 1848 the amount of prize money had been more than doubled. In 1860 the distinction of colour was recognised in the prize list, and separate classes were provided for white and black breeds. At Battersea, in 1862, Berkshires were admitted as a distinct breed. It was not until twenty-one years later—at York, in 1883—that the “Middle Whites” were distinctively recognised, and later still the Tamworths were similarly distinguished. Thus at Windsor there were six separate breeds with 740*l.* of prize money divided amongst them. This attracted 265 entries. It is curious to note that the pigs had more prize money in proportion to their entries than any other kind of stock, except horses.

Unfortunately, the pages of the Journal contain a succession of indictments against the exhibitors of pigs which is not very creditable. The very first official detailed report on the live stock drew attention to the ominous disparity between the evident age of some of the pigs and that stated by the exhibitors. At the first Carlisle Show,¹ the Steward in his report regrets that many of the pigs were “much above the age stated in their certificates.” At the Lincoln Show the Stewards called prompt attention to the existence of similar discrepancies, and Professor Simonds was instructed to examine all the prize pigs, with the result that one of them was disqualified. But the evil did not disappear, and so recently as the Reading Show of 1882 Mr. Charles Howard, in his report as Senior Steward of Live Stock, made the following forcible remarks: “There was a large and excellent show of pigs, many of them being of surpassing merit. I regret, however, to add that our eminent veterinary professors had several disqualifications to make as to age; while other practices were resorted to which, to say the least, do not add to the respectability of the pig exhibitors. It was suggested by some that the Council should institute a rigorous inquiry, in a few of the worst cases, at the homesteads of the exhibitors, and that a report should be published; by others, that the Council would do well to discontinue its show of pigs until a higher tone of morality obtained among pig exhibitors, their bailiffs or herds-men. Leniency in the past has failed; it is therefore high time for the Council to take strong measures to stamp out such disreputable practices, or the honest exhibitor will retire from a contest in which he feels so unequally matched.”

It might reasonably have been thought that a protest so outspoken, coming from one whose authority and experience in all subjects relating to live stock are so unquestionable, would

¹ Journal, Vol. XVI. 1st Series (1855), p. 504.

have had immediate effect, but only two years afterwards the Stewards had to complain of similar practices. A society, like an individual, cannot easily protect itself against absolute bad faith; but it is to be hoped that these frequent remonstrances have at last begun to have some effect upon the few exhibitors who have in the past done only too much to bring discredit upon their class.

WHITE BREEDS.

Authorities seem generally to agree that the Large White breed is descended, practically uncrossed, from the native pig of the country. Mr. Rowlandson in his prize essay¹ says that there are good grounds for supposing that "the old English hog," with flop ears, was originally the only domestic animal of its kind throughout the kingdom. The genuine old English breed was "coarse-boned, long in limb, narrow in the back, and low-shouldered," and Professor Low tells us, further, that it was "mostly white" in colour. It is said that one of the earliest, if not absolutely the first improver of pigs was Bakewell, who applied to the local breed of Leicestershire the same principles which he adopted with such marked success in the case of Long-horned cattle and Leicester sheep. These improved Leicester pigs were subsequently used to improve the breed of Yorkshire. Mr. Coleman, in his work on the pigs of Great Britain, refers to the enormous specimens of white pigs exhibited at the earlier Shows—from 1839 to 1850—of the Royal Agricultural Society, and states that he remembered seeing animals which were estimated at fifty imperial stones. Of late years the Large Whites—always popular—have taken a still more prominent position by reason of the marked favour shown them by the bacon-curers. The display at Windsor was not exceptional either in numbers or merit. There were twenty-seven entries, and the prize-winners were Messrs. J. & W. H. Charles, Sanders Spencer, C. E. Duckering, Denston Gibson, E. W. Harcourt, A. Hiscock jun., J. Nuttall, and Joseph Innes, and the Guardians of Prescot Union.

The Middle White breed has been recognised for a good many years, but the line which divides a Middle White from a Large White on the one hand and a Small White on the other is one which is, to say the least, irregular. Mr. William Wright, in his "*Report on the Farming of Yorkshire*," published in 1861,² says that the Yorkshire Middle breed "are about the same size as the Berkshire, but have smaller heads and are much lighter

¹ Journal, Vol. XI, 1st Series (1850), p. 575.

² Ibid. Vol. XXII. (1861), p. 124.

in bone." Certainly, to the ordinary observer at Windsor there were animals in the Middle White classes which might quite as appropriately have been entered as Large Whites, while there were Small Whites which looked as heavy as some of the Middle Whites. The Judges emphatically expressed their opinion on the subject by declining to award a prize to a pen of sow pigs because they were too much like Large Whites. There were thirty-one entries, the prizes being won by the executors of the late Earl Radnor, Messrs. J. Carter & Sons, G. Charnock, Joseph Nuttall, C. E. Duckering, and E. T. Chalk.

The Small Whites probably owe much to the effect of early crosses with the Chinese breed. They have somewhat waned in favour of late years, owing, perhaps, to their tendency to delicacy. To them, however, the Middle Whites are undoubtedly indebted. There were only twenty-three entries, and the prize-winners were the executors of the late Earl of Radnor, the Earl of Onslow, the Hon. Mrs. Meynell Ingram, and Mr. Joseph Saunders.

Report of Judges of White Pigs.

[Classes 244 to 255.]

LARGE WHITE BREED.

CLASS 244. *Boars farrowed in 1889.*—FIRST PRIZE (Messrs. J. & W. H. Charles). A fair pig of good quality, rather short in ear, and not good on his forelegs. SECOND PRIZE (Mr. Sanders Spencer). Great size for the age, good quality, but had below, and crooked legs.

CLASS 245. *Boar Pigs farrowed in 1889.*—FIRST PRIZE pen (Prescot Union). Very even, great character; one of the best pens in show. SECOND PRIZE (Mr. C. E. Duckering). A fair pen.

CLASS 246. *Breeding Sows.*—FIRST PRIZE (Mr. Denston Gibson's *Worsley Queen*). A good sow; great length, good hair, rather deficient in ham. A very moderate class, with the exception of the First Prize pig.

CLASS 247. *Pen of Three Sow Pigs.*—Fair character.

MIDDLE WHITE BREED.

CLASS 248. *Boars farrowed in 1888.*—FIRST PRIZE (Executors of the late Earl of Radnor). Lengthy, good pig, with fair character; rather coarse in head. SECOND PRIZE (Messrs. J. Carter & Sons). A fairly good, heavy-fleshed pig; rather short in his quarters.

CLASS 249. *Boar Pigs.*—FIRST PRIZE (Messrs. J. Carter & Sons). A good pen, well-grown. Only two pens shown; but we consider the second pen (Mr. Joseph Nuttall) worthy of a SECOND PRIZE.

CLASS 250. *Breeding Sows.*—A very good Class. FIRST PRIZE (Mr. Joseph Nuttall). A wonderfully heavy-fleshed pig. This pig was much knocked about in transit, but, as the injuries were only temporary, we awarded her the First Prize. SECOND PRIZE (Mr. George Charnock). Good in hams and hair. THIRD PRIZE (Mr. C. E. Duckering). A good level sow; rather lacking in size as compared with the First and Second Prize pigs. Nearly the whole of the remaining pigs in this Class were Highly Commended or Commended,

CLASS 251. *Sow Pigs*.—FIRST and SECOND PRIZE pens (Mr. C. E. Duckering and Mr. E. T. Chalk respectively). Very good, and a close competition between the two. One pen in this Class would have been placed, but we considered they showed too much large breed. Two pens in this Class were disqualified—the only two in our department.

SMALL WHITE BREED.

CLASS 252. *Boars farrowed in 1888*.—A very bad Class.

CLASS 253. *Boar Pigs*.—Small competition; nothing worthy of note in the Class.

CLASS 254. *Breeding Sows*.—FIRST and SECOND PRIZE sows (both Hon. Mrs. Meynell Ingram's). Very good and true in character.

CLASS 255. *Sow Pigs*.—Only three pens shown; the First Prize very good.

We were disappointed not to find a larger and better show in our department, which falls much short of former years.

JOHN ANGUS.

JOHN BARRON.

THOMAS M. BESWICK-ROYDS.

BERKSHIRES.

The earlier writers on British live stock persistently described Berkshire pigs as—in the words of Culley—of “a reddish colour with black spots upon them,” whence it has been assumed that Berkshires and Tamworths had a common origin. There is no doubt that a tawny or red breed existed in the county of Berkshire, and that it has been supplanted by, and perhaps assimilated with, the black breed as we now know it. The Secretary of the British Berkshire Society insists, however, that there has been from time immemorial a kind of “inner circle” of breeders, who kept what were the true progenitors of the present Berkshires. He claims to trace back at least seventy years, and to find that the real Berkshires were at that time black with white points, just as at present—viz. a dash of white on the face, four white feet, a white tip to the tail, generally a few hairs on one or both of the elbows, and a patch somewhere under the throat. He says that the Chinese and Neapolitan pigs were tried by some breeders for crossing, but that they failed to effect any improvement, and were not therefore generally introduced. This contention is virtually endorsed by Mr. Spearing in his report of the farming of Berkshire.¹ He says that some few breeders sought to improve the Berkshire pigs by crossing them with the Suffolk, Sussex, and other breeds, but that although the process answered temporarily its effects died out. He himself tried the cross, but returned to the “real Berkshire.”

¹ Journal, Vol. XXI. 1st Series (1860), p. 37.

It is curious that as there were both white and black China pigs, so there was at one time a variety of white Berkshires, which, however, is not recognised now as entitled to the name. The Berkshires have been largely introduced into Ireland, and so early as 1863 an Irish breeder won prizes in this Class at the Royal Show. At Windsor, also, there was an entry of a Berkshire sow from Ireland. There were ninety-six entries in this section at Windsor, and the prizes were won by H.R.H. Prince Christian, Messrs. A. E. W. Darby, Alfred Napier, T. A. E. Hayter, Joseph Saunders, N. Benjafield, R. Fowler, and W. Pinnock.

OTHER BLACK BREEDS.

The entries in the Classes under this heading comprised Suffolks, Sussex, "Small Blacks," and "Large Blacks." The original breed of pigs in Suffolk was small, short, and mostly white. No doubt they formed the stock from which, in the hands of skilful breeders, the present black breed was formed, by the assistance probably of the China pigs. It is some five-and-thirty years since they first came into prominence, and Mr. Thomas Crisp, who was the earliest breeder of them, took a first prize with a Suffolk boar at the Chelmsford Show of 1856. At the Canterbury Show (1860) Mr. G. M. Sexton first exhibited, and since that time his name has been closely associated with the breed, although of late years he has ceased to exhibit.

The variety of size in these classes was, as the Judges remark, confusing. The entries were as follows:—Small Blacks, eighteen; Suffolks, thirteen; Sussex, seven; Large Black, three; Poland-China, one; total, 42. It is noteworthy that not a single entry was described as of either the Dorset or Essex breed, both of which varieties were greatly in favour some twenty years ago. With the Essex pigs the names of Lord Western and Mr. Fisher Hobbs are intimately associated. The Dorset breed—to which some of those present were probably allied—was an instance of a "manufactured breed." Some forty years ago Mr. John Coate put two black sows imported from Turkey to a Chinese boar, and crossed the offspring with a Neapolitan. About the same time Mr. J. A. Smith crossed a black Chinese sow with one of Mr. Fisher Hobbs's Essex pigs. From the two herds thus started sprang the breed of "improved Dorsets." The prize-winners in this section at Windsor were the Duke of Hamilton and Brandon, the Earl of Portsmouth, Messrs. G. Pettit, W. S. Northey, and Francis Sparkes. The Suffolks and Small Blacks each took five prizes, and the Sussex one.

TAMWORTHS.

The remarkable rise and steady progress of the Tamworth is a notable instance of the application of the law of supply and demand to swine. A few years ago many of the fashionable show-pigs of the country bid fair to attain the *reductio ad absurdum* of useless obesity. With the sole exception of aptitude to fatten, nearly all their points of excellence had been assiduously improved away. As producers of lard they were pre-eminent, but from the bacon-curer's point of view they were fast becoming impracticable. Some of the most influential bacon-curers began to publicly protest, and as a result farmers soon realised that their pigs must have more lean, and that the heavy fore-end and short face which they had been developing with so much pains were a fault and not a virtue. At this juncture the Tamworth came opportunely to the fore. The red breed of Northamptonshire had existed in the county from time immemorial, but it had escaped the wave of improvement which had transformed so many other local breeds. It will surprise some people to learn that at the Northampton Show of 1847 a Tamworth sow took first prize, beating the Berkshire, improved Essex, and other breeds. But this was exceptional, and the breed was very little known out of its immediate district until about 1882. At the Shrewsbury Show of 1884, Mr. G. M. Allender took all the prizes in the classes for "other distinct breeds" with his Tamworths. Since then they have made rapid strides in favour both with breeders and buyers, and since 1885 have enjoyed the distinction of separate classes at the Royal Show.

Mr. Allender, in a recent interesting article on this breed, puts in a nutshell the reason of their present value. He remarks that "by good fortune the Tamworth was not crossed with the Chinese, and now that the breeds which were produced by the admixture of Chinese blood have been condemned by the bacon-curer as carrying an excess of fat, this old, lean-fleshed breed will, I think, be as useful for a cross, in a contrary direction, as the Chinese pig undoubtedly was some half-century ago."

There were forty-five entries of Tamworths at Windsor, being the largest display in any section except the Berkshires. The Judges remark on the diversity of type which is commonly characteristic of all breeds at the commencement of their show-yard career. The gradations of colour from a deep rich red to a dull brick-dust tint, and even to a dark slate colour, were very noticeable. The prizes were won by Messrs. W. H. Mitchell, T. Watson, Robert Ibbotson, R. N. Sutton-Nelthorpe and E. D. de Hamel.

*Report of the Judges of Berkshires, Other Black Breeds, and
Tamworth Pigs.*

[Classes 256 to 267.]

BERKSHIRES.

CLASS 256. In the *Old Boar* Class there were several animals of great merit. The FIRST PRIZE boar (Mr. A. E. W. Darby) was of true Berkshire character, though not perfect in hind-quarters. No. 3805 was one of the best pigs in the Class, but his coat was in bad condition.

CLASS 257—*Pens of Young Boars*—was the weakest of the Berkshire Classes. Many of them lacked what is essential in Berkshires, viz. hair.

CLASS 258. *Breeding Sows*.—The Sow Class was exceptionally strong. The FIRST CHAMPION Berkshire (Mr. T. A. E. Hayter) is of beautiful quality, and well deserves the First Champion Prize offered by the Berkshire Society. There were some excellent young sows in this Class, but they were too small to compete successfully with the older ones.

CLASS 259. *Pens of Three Sow Pigs*.—In this Class there were some very promising pigs. Lack of uniformity in the pen is one of the characteristics of this class.

ANY OTHER BLACK BREEDS.

The other black breeds were not so numerously represented, especially in the Boar Classes. There were some very fine sows in Class 262. There were a few pens of the large black breed shown in the same Classes as the small breeds, which makes it very difficult to judge, and we would recommend a separate Class for Large Black Breed.

TAMWORTHS.

The Tamworths mustered in strong force. They are much improved upon what they were a few years ago; but it seems advisable that one type should be adopted as far as possible by breeders.

ARTHUR S. GIBSON.
G. LASCELLES.
ARTHUR CECIL.

XXXII.—*Report of the Steward of Dairying and Poultry at
Windsor.* By the Hon. CECIL T. PARKER.

AN accession of interest in dairy matters in this country has been one of the few cheerful agricultural symptoms of the past decade. In the encouragement of a spirit of inquiry and reform in this direction the Royal Agricultural Society has taken a foremost part. The Society may claim, indeed, to have been one of the earliest pioneers on the road now trodden by an army of able and enthusiastic workers. At the Bristol Meeting of 1878 the Society recognised the importance of the subject by its offer of a liberal and exhaustive list of prizes for dairy appliances and machinery. "The Meeting," said the Council in their report, "will be distinguished by an exhaustive trial of

dairy appliances, the improvement of which is annually becoming of more importance to the English dairy-farmer, both on account of the great scarcity and increasing cost of skilled labour, and in consequence of the improved quality of foreign dairy products."

This exhibition at Bristol, and the interest aroused therein, no doubt paved the way for the organisation of the "International Working Dairy" at the Kilburn Show, which was the first example of an undertaking which has now become familiar, on a more or less complete plan, in show-yards all over the country. The dairy at Kilburn was divided into two sections—English and foreign. The English section, with some American appliances, was worked by the Aylesbury Dairy Company, the foreign section being in the hands of M. Ahlborn, of Hildesheim. The great novelty of the Kilburn Dairy was the Laval Cream Separator, which was awarded a silver medal. This was the first appearance of a separator in England, and the curiosity and controversy which it aroused were extraordinary. Even the Butter Extractor, which distinguished the Windsor Dairy, was a less startling innovation, inasmuch as the utilisation of centrifugal force is now familiar, whereas at that time no method of separating cream, other than by gravitation, had been dreamt of in the philosophy of the British dairy-farmer. Other prominent novelties in the Kilburn Dairy were the "Cooley Creamer" and the American "cot-swing" churn, both of which have since come into use to some extent.

At the following Show—Carlisle—the Council, "in consequence," to quote from their report of May 22, 1880, "of the great interest manifested in the exhibition of dairy machinery at work in the Kilburn Showyard," arranged for an exhibition of the chief kinds of butter-making utensils, and of butter-making on the several systems prevailing "in different districts of England, on the Continent of Europe, and in America." The attempt to show rival methods was soon abandoned in favour of the exhibition of the method which most closely follows scientific principles and improved practice.

At Derby, in 1882, the Working Dairy was recognised as one of the prominent permanent departments of the Show. Lectures were delivered during the Show by Dr. Voelcker, and there was a trial of cream separators in which three machines—the Laval, the Lefeldt, and the Danish—took part.

A more elaborate trial of separators was arranged for the following year at Reading, but it was marred by an application for an injunction in Chancery against the Society, as well as against exhibitors of some of the machines entered. The ap-

plication, which arose in consequence of a dispute about patent rights, was unsuccessful, but it caused some competitors to withdraw from the trial. Consequently, out of ten machines entered, only four—two of Laval's and two of Petersen's "Hamburg" machines—competed, the gold medal being won by one of the Laval separators.

At York, in 1883, the Working Dairy, "for the first time under the exclusive management of the Society," was, as the late Mr. John Coleman reported, "a decided advance upon previous efforts at instruction." The object aimed at was to show a butter factory worked by steam-power, but equally adapted for horse-power, as well as a dairy for hand-power suitable for a small farm. Two prizes of 50*l.* each were offered for dairies suitable for butter- and cheese-making respectively. There were, however, no entries in the cheese-making class, and only two butter-making dairies. These were erected and equipped by Mr. Edward Ahlborn and Messrs. T. Bradford & Co., and the Judges awarded the prize to the former. In connection with Mr. Ahlborn's dairy an apparatus was shown for "making sparkling milk," or, in other words, for aërating skim milk, which it was claimed might find a sale, like ginger-beer, at 1*d.* per bottle. The novel idea does not appear to have gone farther than the York Showyard.

At Shrewsbury, in 1884, certain improvements in the organisation and management of the dairy were made, and horse-power was substituted for steam-power with the view to demonstrating that expensive steam machinery was not an absolute necessity.

At Preston, in 1885, it was arranged to hold a "practical examination" in cheese- and butter-making in the Working Dairy during the week previous to the Show. Only two cheese-makers presented themselves, and as the Judges considered that the process adopted by both of them was totally unfitted for a farmhouse dairy no certificates were given. There were five candidates in the butter-making class, and three prizes and a commendation were awarded. The dairy was under the management of Miss Smithard, who was charged with a similar responsibility at the three succeeding Shows.

At Norwich, in 1886, a new departure was made in the engagement of M. Baquet and M. Paul Mispolet to give demonstrations in the making of French soft cheese. They made Neufchâtel or Swiss double-cream cheese, and "their success," as Sir John Thorold observed in his report, "in making a really palatable cheese under such trying conditions of shaken milk, changeable temperature, and penetrating dust, was worthy of all praise."

At Newcastle, in 1887, as at Norwich, the "practical examinations" for proficiency in butter-making were continued; but at Nottingham the Council decided to have, in their place, competitions for butter-makers, arranged in three classes, viz. (1) for members of a farmer's family, (2) for male hired servants, (3) for female hired servants, with a champion class open to winners in these classes.

Owing to the necessity for providing ample space for the competitors, the building for the Dairy was at Nottingham rearranged. The same plan was followed at Windsor, the arrangement of the various offices and departments being very convenient. The dairy was effectively decorated with flowers and creepers, and roofed with Messrs. Major's patent tiles, with a ceiling of canvas. Owing to our variable climate, it is almost impossible to provide a building always suitable. At Windsor the Dairy was much too hot, whereas at Nottingham it was the reverse.

A considerable portion of the milk used was obtained from cows in the Showyard, the remainder being supplied by the Aylesbury Dairy Company. The total quantity used during the week was about 2,947 gallons.

The machinery at the dairy was unusually interesting. The shafting was sunk below the floor as last year. The power was obtained from a 5 horse-power engine lent by Mr. E. S. Hindley, who also lent a large tank, and a churn elevator with automatic tipping arrangement. The great novelty was the Butter Extractor exhibited by the Aylesbury Dairy Company, which is referred to at length in the report of the Judges of Implements. A new hand-power separator, "The Star," lent by the Aylesbury Dairy Company; a Laval A1 Separator, lent by the Dairy Supply Company; a Victoria Separator, lent by Messrs. Freeth & Pocock; a factory butter-worker and churn, lent by Messrs. Bradford & Co.; a refrigerator, lent by Messrs. Lawrence & Co., and a milk tank, lent by Messrs. Pond & Son, completed the equipment.

Twice each day, commencing on Saturday, June 22, and concluding on Saturday, June 29, there was an "illustration of butter-making" and a lecture by Miss Maidment. The gallery at the Dairy was very largely attended by the public at these times, and also during the competitions.

THE BUTTER-MAKING COMPETITIONS.

A competition for butter-makers was arranged in three classes, and a champion contest, as at Nottingham.

The candidates were divided into the following classes:—

CLASS 1. (*Saturday, June 22*) Churn Makers and Vendors or their Assistants, and Servants employed by Public Companies or Butter Factories.

CLASS 2. (*Tuesday, June 25*) Dairymaids.

CLASS 3. (*Wednesday, June 26*) Dairymen.

CHAMPION CLASS. (*Thursday, June 27*) Limited to the winners of prizes in Classes 2 and 3, and winners of prizes in the Nottingham (1888) Competition other than those winning the Champion Medals.

A Gold Medal was offered by Her Majesty the Queen to the competitor who was adjudged first in the Champion Class, and the Society gave Silver Medals to the competitors placed second and third, as well as a Certificate of Efficiency to the competitors who won money prizes.

Eight quarts of cream were allotted to each competitor. On the two first days ice was supplied *ad lib.*, but on the third and fourth days each competitor was limited to one bucketful. Each competitor used his or her own churn and butter-worker, the Society providing other utensils and salt.

With reference to these competitions, which have now become general all over the country, it appears to me that the object for which they were instituted may be lost sight of by the fact of so many of the competitors becoming, so to speak, "professional." If one looks at the list of competitors and prize-winners at the various shows up and down the country, one cannot but be astonished at the same name recurring over and over again, and the paucity of fresh competitors. I think, therefore, that it will be well for the Dairy Committee to consider if they should not recommend the Council to limit the competition to those living in the district in which the Show is held.

The Dairy was honoured by the presence of Royalty on nearly every day on which the Show was open, and on Thursday afternoon Her Majesty the Queen drove to the Dairy, and after inspecting the machines in work, including the Butter Extractor, was graciously pleased to present a gold medal to Miss Keel, the champion in the butter-making competition. The members of the Royal Family who visited the Dairy besides Her Majesty were the Prince and Princess of Wales, Prince and Princess Christian, Princess Beatrice, Prince Henry of Battenberg, Princess Louise, and the Duchess of Albany.

In concluding this part of my report I wish to record my sincere thanks to the whole of the Staff connected with the Dairy, for they worked with untiring energy from early morn to dewy eve, and made the Dairy of 1889 one of the successes of a great Show; and also to the Secretary of the Society for the information which he has furnished me for the purposes of this report.

The following is the report of the Judges of the Butter-making Competitions :

Report of the Judges of the Butter-making Competitions.

Saturday, June 22. Class 1. Churn Makers and Vendors or their Assistants, and Servants employed by public Companies or Butter Factories.

The Working Dairy was as well equipped and complete as could be desired when the contests commenced on June 22. Twelve persons had entered, but only ten appeared for competition, one female and nine males. Three prizes were offered, and the Judges determined to award these by points: first fixing upon a maximum number for, (a) skilful working, (b) quality, (c) appearance, and (d) weight of butter made, and then defining the highest proportionate approach to it under each head, and taking the highest total to decide the respective winners. The same quantity and quality of cream—8 quarts or 20 lbs.—were given to each. Ice was provided by the Steward *ad libitum*, and free action was allowed to all the workers in its use and in the conduct of all their operations. The temperature of the cream at starting was in one case 55° Fahr., in three others 57°, in five 58°, and in the last 59°. The time taken in churning varied greatly; 30 minutes, 35, 40, 47, 57, 68, 74, 75, 77, and 82 minutes. The first to get butter churned very fast throughout, but the butter was very soft. Another commenced churning very slowly, about 20 revolutions per minute, and never exceeded 45. The remainder all churned faster than this. The best granular condition of butter when the churning stopped was obtained in 68 minutes, the next best in 47 minutes, and in 40, 35, 57 respectively, or in an average of 53 minutes. The weights of butter obtained when completed showed much variation. The highest weight was 6 lbs. 2 ozs., two others weighed 6 lbs. 1oz. each, two 6 lbs. each, one 5 lb. 15 ozs., two 5 lbs. 14 ozs., one 5 lbs. 13 ozs., and the lowest weight was 5 lbs. 12 ozs. The best quality—texture and flavour considered—was with the greatest weight, the next with one of 5 lbs. 14 ozs., and the third with one of the 6-lb. lots, and to these three the prizes were awarded. There was more equality of skill shown in handling the butter-worker, but three had a reduced number of marks placed against them for being too rough, and one an adverse mark for indifferent skill. The winners were:—

FIRST PRIZE, 5*l.*, JOHN CRAIG, 140 High Holborn.

SECOND PRIZE, 3*l.*, JOHN STANLEY LATHAM, 60 Museum Street, W.C.

THIRD PRIZE, 2*l.*, DAVID PULLEN, 140 High Holborn.

RESERVE & V.H.C., CHARLES R. VALENTINE, Ludlow.

HIGHLY COMMENDED, MRS. ESTHER BRADY and G. W. GRAY.

Tuesday, June 25. Class 2. Dairymaids.

The competition on this day was limited to "dairymaids," without any other restriction. There were 27 entries, and only two absentees. Each dairymaid was supplied with the same quantity of ripened cream as the workers were on Saturday. This was measured into twenty-five cans from a large circular vat, in four rounds; two quarts at once, the cream being well stirred meanwhile, and then weighed with exactness to 20 lbs. weight, in order to give precisely the same quantity and quality to each competitor.

Churning commenced at 11.30 A.M., and the Judges watched in detail the following points: (a) use of the thermometer, (b) speed and mode of churning, (c) time taken to produce butter, (d) condition it was in when churning was stopped, (e) washing and salting, and (f) skilful working and

making up on the butter-worker. The weight of butter was next taken into account, and the solidity, texture, and flavour were deciding points. The cream, which was given out at 58° Fahr., was reduced by some to as low as 54°, but the majority started with it at 57° or 58°. The average temperature of the dairy was 70° to 75°, and as it was surrounded by some hundreds of spectators, the conditions were more adverse than those of Saturday, or of dairy work generally.

The first butter was obtained in 22 minutes, the next in 35 minutes, and the next in 38 minutes. The longest time taken was 70 minutes, and the two next longest 66 and 65 minutes. The average time taken was 46 minutes. The speed of churning was about the same all round. One, however, churned very fast—making 75 to 80 revolutions per minute—temperature of cream 56°. She made a heavier weight of butter than many others, but the high speed was not “good speed” as regards quality. The three prize lots of butter were churned, at the temperature of 55°, 56°, and 55°, in 50 minutes, 48 minutes, and 40 minutes respectively, and they made 7 lbs. 0 $\frac{3}{4}$ oz., 7 lbs. 1 $\frac{3}{4}$ oz., and 6 lbs. 15 $\frac{1}{2}$ ozs. butter. The one who took 70 minutes to get butter started with her cream at the lowest temperature—54°—but her butter was eventually “highly commended.” The result of the competition showed that only an approximate degree of temperature of cream or speed of churning can be laid down. The ripeness of the cream, the time, place, weather, and the formation of churn, need consideration. It was noted that those who brought their butter into the best granular condition by churning, generally produced the best quality and weight at the finish, though this was adversely or favourably affected by its treatment on the butter-worker. Some rushed the roller over the newly-formed butter with much force, others turned it smoothly but with firm pressure. Some thrashed and beat it hardly with the butter-pats, others treated it gently, as a delicately formed product should be. The colour and bloom of butter, its texture, grain, and quality, are easily injured. Weight is also affected by the careful collection of all particles of butter, and the constant use of the sieve during the whole process of making.

The best time to stop churning is as soon as the butter appears in small dots, and the proper condition to take it out of the churn is when it is like pin-heads on a pincushion—completely separated from the milk, but clinging slightly together, yet so slightly as to fall apart when held up in a hand-bowl. Good butter is easily made when this is done. The form and appearance when finished, however, is important. Good shape, equal size for packing, together with colour and solidity, all tell in the market. This is said in order to enforce attention to all details. Wise and skilful treatment of milk before churning, and of the butter during manufacture, are necessary to reap all the profits of butter-making.

It was most interesting to watch the application and earnestness which almost every competitor gave to the competition on this occasion. There were two ladies of position, Lady Margaret Byng and Miss Esther Lyle Smyth, who have taken up dairy work as an example and a stimulus to others, and who sought rather than shrank from the labour of competition. There was a girl of seventeen years, and a woman of more than three times that age, the first tractable and teachable, the other self-sufficient and prejudiced in favour of old methods of the most doubtful kind; with more than twenty others, all proceeding thoughtfully, and evincing the national desire to excel. Only one did not use a thermometer.

The Judges found the competition so close and good that they solicited and obtained from the Council three additional prizes, with the privilege of joining in the champion competition for the Gold Medal offered by Her Majesty the Queen.

The following were the Awards made in this Class:—

FIRST PRIZE, 5 <i>l.</i> ,	MRS. WILLIAMS, Regilbury Park, Winford, Bristol.
SECOND PRIZE, 3 <i>l.</i> ,	MISS ADA WILLIAMS, Chew Stoke, Bristol.
THIRD PRIZE, 2 <i>l.</i> ,	MISS S. I. KEEL, Stanton Drew, Bristol.
EQUAL FOURTH	MISS H. M. DOWNES, Richards Castle, Ludlow.
PRIZES OF 1 <i>l.</i> EACH,	MISS ELLEN JONES, Sydenham Farm, Bridgwater.
	MISS GWENLLIAN MORGAN, Clemenstone, Glamorgan.
HIGHLY COMMENDED:	MISS ANNIE BOWDAGE, Cotton Hall, Denbigh.
Ditto	LADY MARGARET BYNG, Sherborne House, North-leach.
Ditto	MISS M. H. COOKSON, Chadwick Grange, Worc.
Ditto	MISS F. M. HOLMES, British Dairy, Paris.
Ditto	MRS. C. L. HORTON, Chumley Heath, Northwich.
Ditto	MISS ESTHER LYLE SMYTH, Barrowmore, Chester.
Ditto	MISS AGNES A. WALKER, Dymock, Glos.
Ditto	MISS ANNIE MARY WELSON, Leominster.
COMMENDED:	Nos. 13, 14, 16, 28, 29, 32, and 35.

Wednesday, June 26, 1889. Class 3. Dairymen.

The competition next day by "dairymen" was less interesting: still large numbers of spectators were present continuously. Nine men had entered, but one was absent when the numbers were called. The same method of serving out the cream, of noting the churning, and of working-up was pursued, and the quantity and quality of butter produced fully considered. The continued heat of the weather and the more ripened state of the cream placed the competitors at a disadvantage as compared with the previous day's workers, but their work was not equal in merit. The cream when put into the churn was cooled down by three competitors to 54°, 56°, and 57°, but the others started at 58°, 59°, and 60°. Their churning was soon done: one finished in 10 minutes, another in 17, two others in 20 minutes each, and one in 25 minutes. The other three were 43, 46, and 48 minutes respectively. "Soft" and "Very Soft" described the butter of several, and a less number of marks were given for texture, flavour, and solidity. The lighter and more nimble handling of women is certainly in their favour in hot weather. The weights of butter obtained varied from 7 lbs. 5½ ozs. to 6 lbs. 5½ ozs. There was more variation in skill and in results. Adaptation in the dairy, as in every sphere, must be studied, and success here needs intelligent observation, and ever-careful practice. The winners were:

FIRST PRIZE, 5*l.*, FREDERICK C. PAINE, Hengrave, Bury St. Edmunds.
 SECOND PRIZE, 3*l.*, JOHN COTTAM, Well House, Scotforth, Lancaster.
 THIRD PRIZE, 2*l.*, THOMAS SMITH, Barronmore Farm, Chester.
 RESERVE NUMBER, FREDERICK GINGER, 49 Kensington Park Road, Notting Hill.

Thursday, June 27, 1889. Champion Class.

This competition was for the Gold Medal given by Her Majesty the Queen and for two Silver Medals given by the Society, and the competitors were limited to winners of prizes in the two previous competitions (Classes 2 and 3) and to two of the winners at Nottingham last year (or eleven in all). Extra care if possible was taken to give an equal quantity and quality of cream to each competitor, and they started at 11.40 A.M. All being prize-winners the results were both more uniform and of superior character. The

temperature of cream at starting showed that three of them preferred 55°, two 56°, five 57°, and one only 58°. The time taken in churning ranged from 33 to 46 minutes. The granular condition of the butter when churning stopped, and the condition when put upon the butter-worker, were written as "Good" and "Very Good" in all cases, with an addition of points in some—one, two, or three. The texture, colour, and flavour had also almost equal marks, while the weight of butter obtained ranged only from 6 lbs. 14½ ozs. to 7 lbs. 1¾ oz. in nine cases, the other two being 7 lbs. 6 oz. and 7 lbs. 3¾ ozs. After giving much consideration and careful criticism to the relative position of each claimant, the Judges found they had given most points to No. 30 (12½), that Nos. 31 and 39 were equal (11), the next being No. 38 (10½), next, No. 27 (10), the next, No. 22 (9½), and the next, No. 49 (9). They Very Highly Commended all these, and Highly Commended all the others, their points ranging from 6 to 8½ above the average. The names of winners in this competition were as follows:—

GOLD MEDAL, Miss S. I. KEEL, Stanton Drew, Bristol.

SILVER MEDAL, Miss G. MORGAN, Clemenstone, Bridgend, Glamorgan.

SILVER MEDAL, Miss A. WILLIAMS, Chew Stoke, Bristol.

VERY HIGHLY
COMMENDED { Mrs. WILLIAMS, Regilbury Park, Winford, Bristol.
Miss E. JONES, Sydenham Farm, Bridgewater.
Miss DOWNES, Court House, Richards Castle, Ludlow.
Miss AMY BARRON, Borowfield House, Borrowash,
Derby.

(Signed) GEORGE GIBBONS,
THOMAS RIGBY.

DAIRY CATTLE MILKING TRIALS.

The results of the competitions for Dairy Cattle in Classes 155 and 156 come conveniently under the head of the dairy department, and are therefore included in this report. The prizes offered for Dairy Cattle at Windsor had been amplified on lines laid down at the previous Show; the Classes being as follows:—

Cows, in-milk (of any breed or cross), giving the greatest quantity of milk containing not less than 12 per cent. solids and 3 per cent. Butter-fat.

CLASS 155 A.—Cow, over 1,200 lbs. live-weight.

CLASS 155 B.—Cow, between 900 and 1,200 lbs. live-weight.

CLASS 155 C.—Cow, under 900 lbs. live-weight.

Cows, in-milk (of any breed or cross), giving the greatest weight of Butter-fat; the yield of milk to be not less than 25 lbs. per day.

CLASS 156 A.—Cow, over 1,200 lbs. live-weight.

CLASS 156 B.—Cow, between 900 lbs. and 1,200 lbs. live-weight.

CLASS 156 C.—Cow, under 900 lbs. live-weight.

The cows entered in the above Classes 155 and 156 were milked dry on Monday morning, June 24, and were then at once weighed. They were placed by the Steward, according to the weights then registered, in one of the three sub-

divisions, A, B, C, of each class, for the purposes of the competition. There was a notable increase in the number of cows entered for the milking test. Last year only eighteen presented themselves, but at Windsor there were fifty-two entries, and of these forty-one actually came to the pail.

Dr. Voelcker, who superintended the trial, has made the following report:—

Report of the Consulting Chemist on the Analyses of Milk from Cows competing in the Dairy Classes, Nos. 155 and 156.

As instructed by the Dairy Committee I attended the Windsor Meeting, and with my assistant Dr. Leather took samples of the milk yielded by the cows competing in the above classes. These samples were subsequently subjected to analysis, and the awards were determined on the basis of the results so obtained.

In accordance with the previously made arrangements, the Cows were divided into two classes, which might be termed respectively the "milk-yielding" class, and the "butter-yielding" class. Each was again subdivided into three, according to the live-weights of the animals, viz. cows of over 1,200 lbs. live-weight (subdivision A), cows between 900 lbs. and 1,200 lbs. live-weight (subdivision B), and cows under 900 lbs. live-weight (subdivision C).

The cows having arrived in the yard on Saturday, June 22, they were allowed to rest until Monday morning, June 24, when they were milked dry in the presence of the Steward. After this they were weighed, and according to these live-weights recorded they were placed in the several divisions of the two Classes.

Out of a total entry of twenty-six in Class 155, sixteen appeared for the competition on Monday evening, and twenty-five out of thirty-six entered in Class 156. Thus there was at each milking the yield of forty-one cows to be weighed, sampled, and analysed. The milking was conducted under the supervision of the Steward of Dairying, the Hon. Cecil Parker, and the Steward of Cattle, Mr. Miller. With their help and that of other willing hands, Dr. Leather and I were enabled to get through the work expeditiously, record the weights, sample the milks, and despatch the latter to London for analysis. Owing to the proximity of the Show to London it was found more convenient to send the samples to the Society's Laboratory and analyse them there instead of erecting, as in the previous year, a temporary laboratory on the Show Ground.

The first milking for the competition took place at 5 P.M. on Monday, June 24, the second on Tuesday morning at 7 A.M. Samples of each milking were separately analysed, and each in duplicate. On arrival the specific gravity was very carefully taken, then the butter-fat determined by Soxhlet's areometric method, the total solids being calculated from these determinations according to the well-known formula. In the accompanying tables are given the details, both of the competition and of the analytical results. Unlike last year, when a number of samples had to be diluted in order to estimate the fat percentage by the areometric method, this had only to be resorted to this year in six cases.

In Class 155, for Cows yielding the greatest weight of milk, the condition was added that the milk should contain not less than 12 per cent. of solids and 3 per cent. of butter-fat. That this proved a by no means unimportant

condition was shown by the result, inasmuch as in the heavy-cow division only the three prize winners fulfilled it, while in subdivision B there were two other failures, no less than seven out of the sixteen competing cows in the whole class coming below the standard fixed. The greatest weight of milk was obtained from Lord Egerton of Tatton's cow, No. 2557, but it fell below the standard of quality, and the First Prize in division A was easily won by No. 2569, a cow the property of Mr. Sherwin, a tenant on his lordship's estate. Mr. Sherwin also gained the Third Prize in this class with No. 2568, the second prize falling to Mr. G. Church with a Shorthorn cow, No. 2554.

In subdivision B, the differences between individuals were not of the striking character shown in subdivision A, and the milk taken altogether was of much better quality. No. 2547, a Shorthorn cow, gave the richest milk, but fell a few ounces short of No. 2552, for quantity, and so was placed second to the latter. Mr. Fortescue's Dutch cow came third, being below the others both in quality and quantity.

A surprising feature was the inclusion in this class—according to its live-weight—of a Kerry cow, No. 2567. This animal gave no less than 40½ lbs. of milk at the two milkings, and it may be added that the live-weight was subsequently checked so that there should be no mistake as to its inclusion in this division.

In division C, there were only two entries, both of them qualifying for the prizes.

In Class 156, the competition was more extensive. In the subdivisions A and B, for heavy and middle-weight cows, the Guernseys scored victories over the other breeds, whilst division C was composed entirely of Jerseys. It may be mentioned by way of explanation that the butter-fat was stated not as *percentage* in the produce of each milking, but that the percentage was taken in connection with the yield of milk, and thus the total *weight* of butter-fat given in the two milkings was recorded, or, in other words, the total weight of butter which each cow might be expected to produce in the two milkings.

In only one case did the yield of milk fall below 25 lbs., the limit named in the conditions. For heavy cows, Sir F. Montefiore's Guernsey cow, No. 2604, with very rich milk, came out well above her competitors, and showed a butter-fat yield of 2¼ lbs.; Mr. G. Sampson's Shorthorn, No. 2598, being second, and also above Mr. Garrett Taylor's red-polled cow, No. 2582. The milk of the Shorthorns, Nos. 2573 and 2574, was decidedly rich, but very deficient in quantity for cows of such size and weight.

In division B, a Guernsey again came to the front, Mr. Forster's cow, No. 2600, winning the First Prize; though by a smaller margin than the Guernsey in division A; a Guernsey also obtained the Third Prize, the Second going to Lord Egerton of Tatton. The richest milk in this division was obtained from No. 2590, a Jersey cow.

In the last division Jerseys only competed, and here the quality of milk was high all round. The richest was that of No. 2594, the Second Prize winner, but No. 2592, belonging to Mr. Alfred Brown, gave much the highest yield of milk, and that of high quality too, and so won the First Prize. Mr. Baxendale's cow, No. 2597, divided second honours with No. 2594.

In conclusion I have to express my obligation to the Aylesbury Dairy Company, for the loan of various apparatus which facilitated the conduct of the trial, and also to their able chemist, Dr. Vieth, for many kind suggestions and assistance.

J. AUGUSTUS VOELCKER.

CLASS 155.—COWS IN MILK OF ANY BREED OR CROSS, GIVING THE GREATEST QUANTITY OF MILK CONTAINING NOT LESS THAN 12 PER CENT. SOLIDS AND 3 PER CENT. BUTTER-FAT.

No. in Catalogue	Name of Exhibitor	Breed of Cow	Live-Weight	Weight of Milk		Total Yield of Milk	Specific Gravity of Milk		Percentage of Solids		Percentage of Butter-fat		Prize
				Monday evening	Tuesday morning		Monday evening	Tuesday morning	Monday evening	Tuesday morning	Monday evening	Tuesday morning	
DIVISION A													
(Cows over 1,200 lbs. live-weight)													
2551	Stand Stud Company	Not stated	lbs.	lbs. oz.	lbs. oz.	lbs. oz.	1032	1032.6	10.8	10.3	2.07	1.63	1 ²
2554	George Church	Shorthorn	1365	27 8	32 12	60 4	1030.4	1033.1	12.0	11.9	3.66	2.84	2nd.
2555	Garrett Taylor	Red-polled	1304	21 4	25 0	46 4	1031.2	1032.6	11.6	12.1	2.74	3.15	3
2557	Lord Egerton of Tatton.	Not stated	1225	19 0	20 4	39 4	1032.2	1032	11.3	11.9	2.50	3.01	2
2561	Joseph Bennett	Shorthorn	1334	28 0	36 8	64 8	1031.9	1032.8	11.7	10.9	2.90	2.05	2
2565	George F. King	Shorthorn	1505	23 8	27 0	50 8	1032.2	1033.7	12.1	10.9	3.21	1.88	2
2568	Charles Sherwin	Not stated	1389	24 0	24 12	48 12	1031.4	1031.2	11.3	12.2	2.36	3.46	3rd.
2569	Charles Sherwin	Not stated	1264½	14 4	26 4	40 8	1033.2	1033.2	13.0	11.9	3.75	2.84	1st.
DIVISION B													
(Cows between 900 lbs. and 1,200 lbs. live-weight)													
2547	Cadogan Dairy Company	Shorthorn	1165	23 8	27 4	50 12	1030.4	1034.5	13.5	13.3	4.66	3.69	2nd.
2552	Stand Stud Company	Not stated	1165	20 12	30 8	51 4	1030	1031.2	13.3	11.4	4.62	2.82	1st.
2553	Stand Stud Company	Not stated	1122	20 0	25 8	45 8	1030.4	1031.2	11.65	11.5	3.16	2.89	1
2558	Lord Egerton of Tatton.	Not stated	1125	21 8	25 4	46 12	1031.2	1032.2	11.4	11.5	2.81	2.73	2
2560	Archer Irvine Fortescue	Dutch	1191	23 0	25 4	48 4	1031.8	1032.5	12.8	11.6	3.74	2.66	3rd.
2567	Aylesbury Dairy Comp'y.	Kerry	984	19 12	20 12	40 8	1031.1	1031.7	12.3	12.2	3.59	3.44	
DIVISION C													
(Cows under 900 lbs. live-weight)													
2549	Earl of Abingdon	Jersey	825	14 0	17 12	31 12	1030.5	1031.6	13.4	12.9	4.59	4.04	2nd.
2562	Walter Barron	Jersey	870	21 12	26 0	47 12	1030.3	1032.0	12.8	11.7	4.10	2.94	1st.

^a Slightly low in solids and fat.^a Low in solids and fat.¹ Low in solids.

CLASS 156.—COWS IN MILK, OF ANY BREED OR CROSS, GIVING THE GREATEST WEIGHT OF BUTTER-FAT;
THE YIELD OF MILK TO BE NOT LESS THAN 25 POUNDS PER DAY.

THE YIELD OF MILK TO BE NOTED LESS THAN 25 POUNDS PER DAY.																		
No. in Catalogue	Name of Exhibitor	Breed of Cow	Live-weight	Weight of Milk		Total Yield of Milk	Specific Gravity of Milk		Percentage of Total Solids		Percentage of Butter-fat		Weight of Butter-fat		Total Weight of Butter-fat	Prize		
				Monday even.	Tuesday morn.		Monday even.	Tuesday morn.	Monday even.	Tuesday morn.	Monday even.	Tuesday morn.	Monday even.	Tuesday morn.				
DIVISION A (Over 1,200 lbs.)																		
2570	Stand Stud Company.	Not stated	1533	20	0	24	0	1029.6	1031.4	12.1	11.0	3.65	2.43	1.31	3rd.			
2573	Geo. Church	Shorthorn	1407	12	4	16	4	1029.5	1033.1	13.0	11.4	4.55	2.44	.89				
2574	Geo. Church	Shorthorn	1316	12	0	16	12	1027.5	1028.7	12.4	11.1	4.66	3.07	.51				
2582	Garrett Taylor	Red-polled	1216	20	4	25	4	1032.2	1032.4	12.6	12.1	3.58	3.15	1.52				
2583	Garrett Taylor	Red-polled	1536	19	4	21	12	1031.2	1033.2	12.7	11.8	3.88	2.73	.74	2nd.	1st.		
2586	Lord Egerton of Tatton.	Not stated	1276	21	0	23	4	1030.1	1032.3	12.1	12.0	3.64	3.04	.47				
2588	Joseph Bennett.	Shorthorn	1276	13	12	16	4	1033.2	1034.6	12.6	11.6	3.47	2.32	.89				
2598	Geo. Sampson	Shorthorn	1396	28	8	35	8	1034.7	1035.5	12.6	12.5	3.13	2.79	.39				
2601	R. E. Loft	Red-polled	1261	11	4	13	0	1031.6	1032.2	11.9	12.9	3.34	3.89	1.21	1st.			
2604	Sir Fras. A. Montefiore, Bt.	Guernsey	1308	22	8	21	4	1032.2	1034.6	14.5	14.0	5.38	4.3	.51				
2605	Richard Stratton	Shorthorn	1252	15	8	16	4	1031.1	1030.4	12.0	12.3	3.30	3.66	1.10	2nd.			
DIVISION B (300-1,200 lbs.)																		
2571	Stand Stud Company.	Not stated	1004	21	0	22	12	1031.0	1033.8	12.8	11.1	3.97	2.46	.83			2nd.	
2587	Lord Egerton of Tatton.	Not stated	1040	20	12	27	0	1031.1	1031.5	12.6	11.7	4.01	3.21	.86				
2590	Howard H. Howard-Vyse	Jersey	1012	14	0	16	12	1032.7	1034.8	14.9	13.8	5.62	4.29	.78				
2591	W. Sidney Baker	Guernsey	1044	17	8	25	0	1031.6	1033.0	13.4	12.2	4.46	3.09	.77				
2600	John C. Forster.	Guernsey	960	17	0	22	0	1033.2	1034.1	13.7	14.3	4.63	4.58	.78	3rd.	1st.		
2602	R. E. Loft	Red-polled	1192	12	0	16	0	1031.6	1032.9	13.4	13.1	4.39	3.82	.52				
DIVISION C (Under 900 lbs.)																		
2580	Hon. Mrs. Cecil Howard.	Jersey	764	13	12	21	8	1035.9	1032.8	13.4	13.4	3.55	4.14	.48	1st.			
2584	Henry Jas. Cornish	Jersey	872	14	12	18	8	1031.5	1032.6	13.4	13.5	4.42	4.28	.65				
2592	Alfred Brown	Jersey	876	21	8	27	0	1032.0	1033.8	14.3	13.7	5.31	4.07	1.14				
2593	Edward Carter	Jersey	808	15	12	15	12	1032.3	1033.7	14.1	14.5	4.84	5.17	.81				
2594	Geo. Blackwell	Jersey	796	19	0	15	12	1031.1	1033.3	15.0	15.1	6.18	5.72	1.17	2nd (eq.)			
2595	Geo. W. Hastings, M.P.	Jersey	844	18	0	13	4	1033.0	1034.6	13.8	12.1	4.40	2.67	.35				
2596	Salisbury Baxendale	Jersey	844	15	8	19	4	1031.6	1033.8	14.3	14.5	5.39	4.82	.83	2nd (eq.)			
2597	Salisbury Baxendale	Jersey	892	18	8	20	8	1031.1	1032.4	14.6	14.4	5.71	5.02	1.03				
+ Yield of milk below 25 lbs.																		

* Yield of milk below 25 lbs.

CHEESE.

There was a very good show of cheese, 166 entries altogether. The classes for new and old cheese filled about equally well, though, no doubt, this department of the Show is to some extent prejudiced by the inopportune time of year for cheese-makers. The plan suggested in last year's report of permitting exhibitors to make only one entry in each class was adopted, and, while it tended perhaps to curtail entries, its obvious fairness recommended it. It is satisfactory, however, to report progress since the Kilburn Show, where several of the prizes were withheld from lack of merit. There is no doubt that during the past ten years increased attention has been devoted to the task of meeting foreign competition in the supply of cheese, and that the British cheese-maker stands now in a better position in this respect than he did then.

Report of the Judges of Cheese.

As regards the show of Cheese, we think there is a great improvement, but we would like to call attention to Class No. 36, Nos. 345, 352, and 355, which, had the condition been good, would have taken a different place in respect of prizes.

The make of 1889, considering how early the Show is held, shows much merit.

The *Stilton* class, we are sorry to say, shows no merit, the condition being so bad, and we should have felt justified in not awarding any prizes. We hope for improvement in this class, knowing how strongly the foreign production is competing with this sort of Cheese.

JAMES WATSON,
GEORGE BOWLES.

BUTTER AND SOFT CHEESE.

There were thirty-nine entries in the two classes for soft cheese. All but eight of them were ordinary cream cheese. This is a branch of dairying in which more resourcefulness might well be displayed,

There was an imposing display of butter, no less than 288 entries being made; of these 117 were in the class for fresh butter free from salt, and 128 in that for fresh butter slightly salted. The First Prize for fresh butter, and the Second Prize for slightly salted butter, were awarded to Her Majesty the Queen for the exhibits from the Royal Dairy at Windsor.

Report of the Judges of Soft Cheeses and Butter.

CLASS 44—for *Fresh Butter free from Salt*—contained one hundred and sixteen entries, and was worthy of the Jubilee Show, as the average standard was very high and the prize samples perfect. The Judges would, in this and the next class, have been glad to have had the opportunity of

awarding more prizes, and they felt bound to give a large number of High Commendations.

CLASS 45—for *Slightly Salted Butters*—comprised one hundred and twenty-seven entries, many of which were splendid samples, but there was not such uniformly high quality as in the previous class.

CLASS 46—*Whey Butter*, ten entries—was not of a high standard.

In CLASSES 42 and 43—*Soft Cheeses*—there were forty entries. Some of the exhibits were very creditable, and this department of the dairy industry deserves greater attention being paid to it.

GEORGE GIBBONS.
THOMAS RIGBY.

DAIRY APPLIANCES.

The following prizes were offered for appliances connected with dairy matters; but the competition was rather disappointing, there being only three entries of Dairy Thermometers, seven of small Butter Boxes, seven of large Butter Boxes, and three of vessels for Preserved Butter.

	First Prize £	Second Prize £	Third Prize £
CLASS 4.—Strong DAIRY THERMOMETER, with broad Mercury Column, to float upright in Milk or Cream at about 40° Fahr., and to be scaled in a very bold clear manner from 40° to 120° Fahr.	5	—	—
CLASS 5.—Collection of Non-returnable PARCEL-POST BOXES to carry from 1 lb. to 5 lbs. of butter	3	2	1
CLASS 6.—Collection of Non-returnable PARCEL-POST BOXES to carry from 5 lbs. to 10 lbs. of butter	3	2	1
CLASS 7.—VESSEL TO CONTAIN PRESERVED BUTTER, closed hermetically, without the use of solder	3	2	—

Sir John Thorold, as Judge, makes the following report:—

Report upon Dairy Appliances.

I regret that I cannot report favourably of the Dairy Appliances that came under my notice at the Windsor Show.

The Thermometers (Class 4) were not scaled with sufficient clearness, and many of them would not float with the scale clear of the milk or cream. The scale should be divided into single degrees, and the degrees should be larger, so as to be more easily read.

The Boxes (Classes 5 and 6) were more satisfactory, but the exhibitors had not sufficiently kept in mind the condition of the Prize List, that the boxes were to be Non-returnable. What we want is a very cheap light box, sufficiently strong to stand one journey by rail or parcel post.

The vessels to contain Preserved Butter (Class 7) were not of sufficient merit to justify me in awarding a Second Prize. In this case I think we require a glazed earthenware vessel which can be easily cleaned and used again, with an air-tight covering.

I would venture to suggest that the Society should continue to offer prizes for these and any other small articles used in the dairy; the makers would then have an opportunity of improving upon their previous exhibits, and the public would benefit at a very small cost to the Society.

J. H. THOROLD.

DAIRY DESIGNS.

By the liberality of the Surveyors' Institution fifty guineas were offered in prizes in the following classes:—

	First Prize Guineas	Second Prize Guineas
CLASS 8.—DESIGN for the best CHEESE DAIRY for a farm of under 100 acres	10	—
CLASS 9.—DESIGN for the best BUTTER DAIRY for a farm of under 100 acres	10	—
CLASS 10.—DESIGN for the best CHEESE DAIRY for a farm of over 100 acres	10	5
CLASS 11.—DESIGN for the best BUTTER DAIRY for a farm of over 100 acres	10	5

The following were the chief regulations under which these prizes were offered:—

1. The designs can be shown either separately or as part of the farm dwelling house.
2. A short specification, with estimate of cost, must be sent with each competing design. In awarding the prizes, the expense of erection and equipment will be taken into consideration.
3. The designs must be sent to the Society's house, 12 Hanover Square, W., on or before Saturday, June 1, 1889, with a distinctive motto legibly written on each drawing and on the specification.
4. Each competitor must enclose his name and address in a sealed envelope (to accompany the designs), on the outside of which only his motto and the class in which the design is competing may be written.
5. All the designs sent in for competition will be exhibited in one of the buildings in the Society's Showyard in Windsor Great Park, and the awards will be announced on or before the first day of the exhibition.

Unfortunately these prizes failed to attract more than a few competitive designs. Neither of the Cheese Dairy classes contained a single entry, and in the classes for Butter Dairies the Judges (Mr. Allender and myself) were bound to report that they were dissatisfied even with those designs to which prizes were awarded. The winners of the First Prizes in both these classes were Messrs. T. Bradford & Co., and in addition to this there were two other entries in each class.

The Council having resolved that the Prize Designs should be published in the Journal for the general information of members, Messrs. Bradford's plans are reproduced in the following pages, together with the specifications which accompanied them:—

Specification of Butter Dairy, for Farm of over 100 Acres.

The Dairy as shown on the Plan on page 732 is designed for the work of a large Dairy Farm of 80 to 100 cows, or, with the addition of another Separator, a much larger quantity of milk could be treated, and the work would not be stopped by an accident to either of the Milk Separators.

BUILDING.

The building faces the north, consists of four rooms, and is adjoining the fodder room, so that the shafting is available for driving the machinery in the latter.

Walls, constructed of whatever bricks would be most easily obtained in the locality, are formed with cavities, to keep out the heat in summer and the cold in winter, and would be lined in the interior up to a height of, say 4 ft. 6 in., with glazed brickwork, so that they can be easily cleaned.

Roof would be covered with ordinary slates, which modern authorities consider form a cooler and tighter roof than tiles, and a better protector against dust.

There is a ceiling formed of tongued and grooved match-boarding, either painted or varnished, and which has the advantage of being a non-conductor and easily cleaned.

The space between the ceiling and the slates is ventilated by the inlet flues A and the outlet flue B, so as to counteract the heat generated by radiation from the roof and keep the ceiling cool.

Floor would be of either cement or flags, according to locality; and the drainage by open channels, leading on to outside gulleys situated away from the opening to the dairy, thus excluding injurious gases.

Windows are all situated on the north side, so as to be out of the sun's rays, and the top light would be hung at the bottom, and open inwards, with a gauze screen on the outside to exclude dust or insects.

VENTILATION.

The ventilation would be effected by the extracting flues C, which, being situated on either side of smoke flue S, would be warmed by the latter, and thus an upward current always maintained irrespective of wind and weather.

These ventilating flues would extract the air from the Dairy by the ventilators D, situated close under the ceiling so as to remove the warmest air. In the store two inlet flues E fitted with regulators will provide fresh cool air from the north side, and from these the air will pass through the store and out through the openings F into the Dairy, the current through both rooms being maintained by the flues C previously mentioned.

The *Boiler House* and *Cleaning Room* will also be ventilated into one of the extraction flues C.

If the local conditions are favourable, the fresh air for the inlet flues E in store, could be brought through an underground culvert so as to cool the air in transit.

HEATING.

In the winter the Dairy would be heated by a steam pipe carried along the walls and regulated by valve.

Dairy Scullery forms an entrance into the Dairy, thus keeping the latter clean and cool.

In the verandah outside would be situated the STEAMING JET, and BENCH for draining and sweetening the cans by exposure to the air.

WASHING-UP TROUGH formed of Galvanised Iron would be situated at end, with cold water supply, steam boiling apparatus, and drainer. This apparatus will also supply boiling water.

COLD WATER STORAGE tank in roof.

DAIRY.

The Dairy would be provided with mechanical ELEVATOR for delivering the milk immediately it is received into the MILK STORAGE TANK, carried on raised platform, and which could be fitted with sieve, if desired.

The milk would then gravitate over the milk warmer into the SEPARATOR, which latter would be capable of separating 90 gallons of milk per hour.

[Continued on page 736.]

Fig. 1.—Plan of Butter Dairy for a Farm of over 100 Acres.

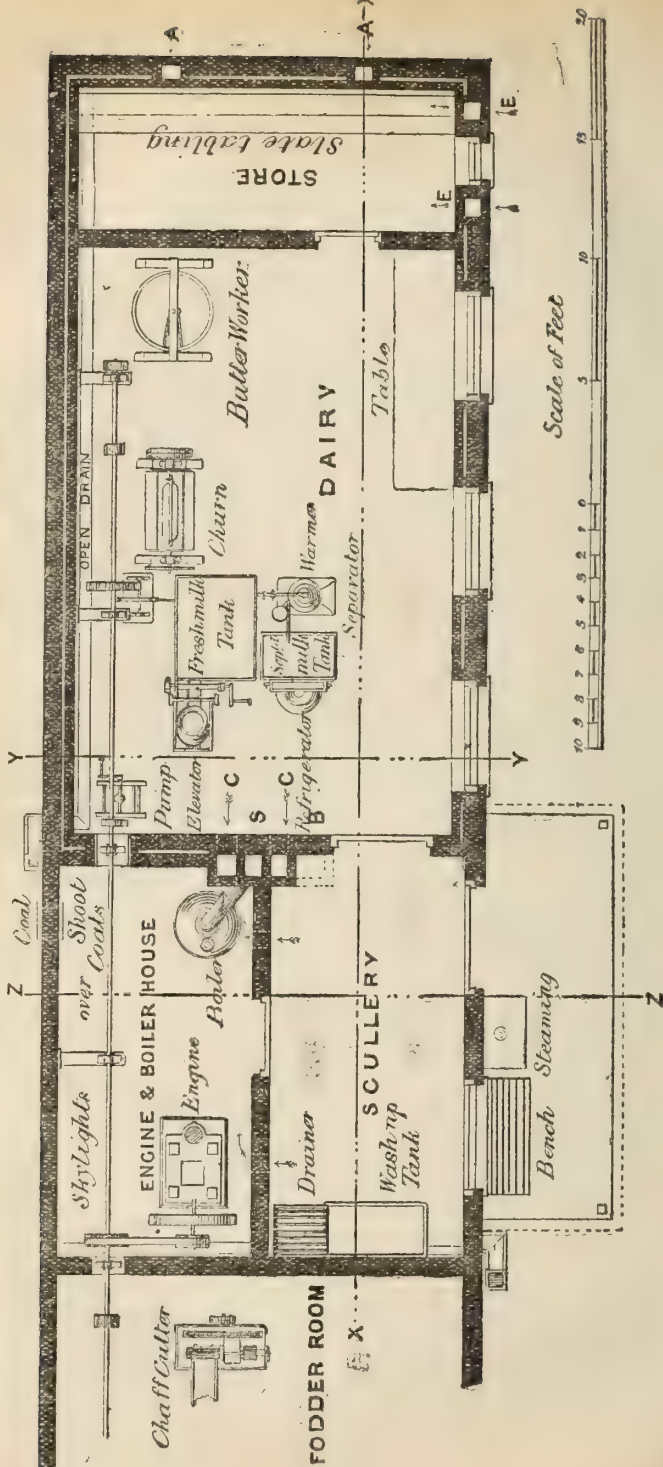


FIG. 3. — Buller's Lighthouse, showing plan and elevation of tower, 100 ft. diameter. A. Inside of tower. B. Outside of tower. C. Plan of tower.

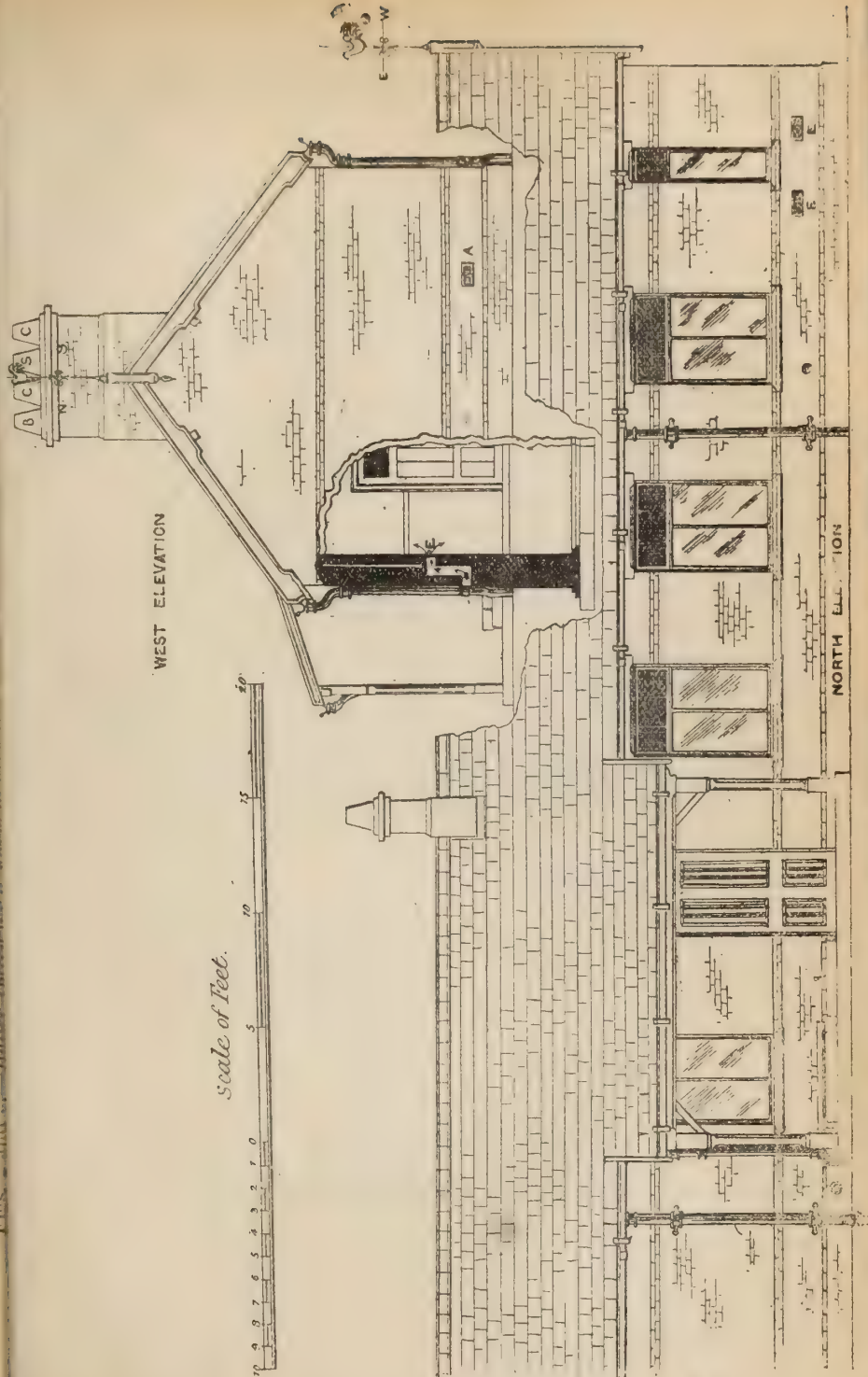
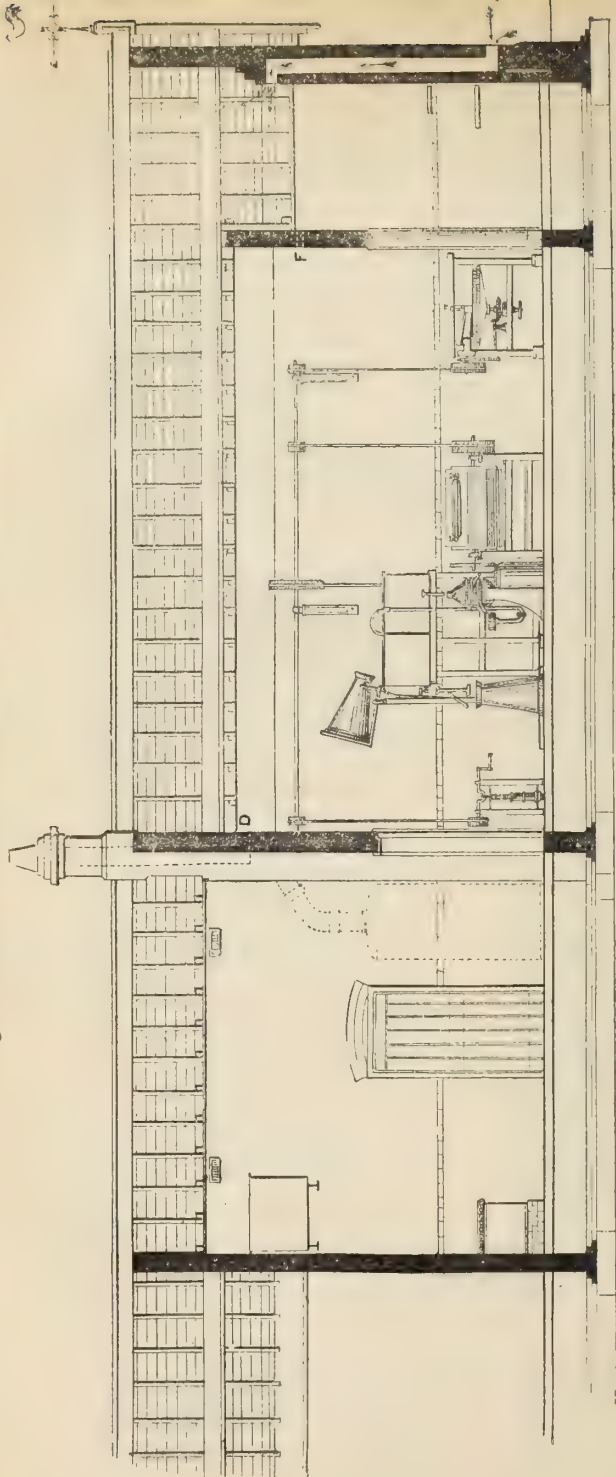


Fig. 4.—Butter Dairy for a Farm of over 100 Acres—Section.



SECTION ON LINE X.X.

Scale of Feet.

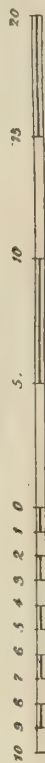
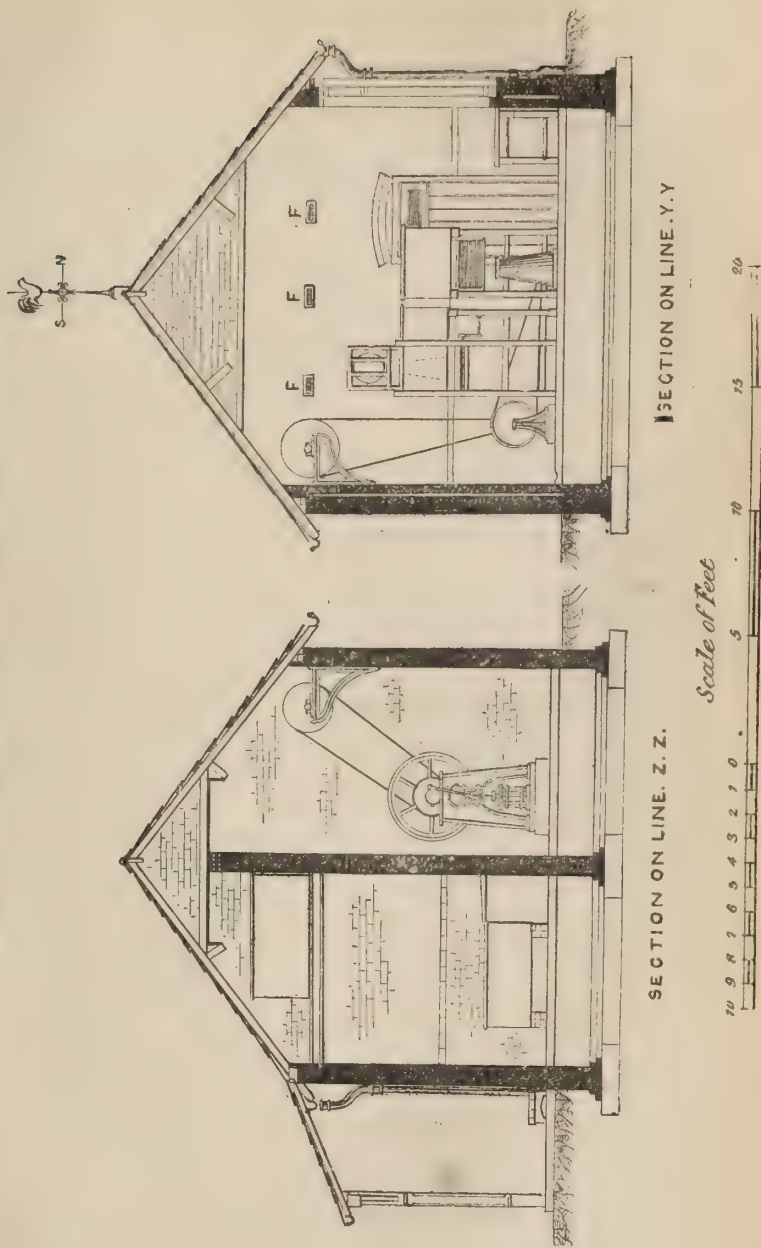


Fig. 5.—Butter Dairy for a Farm of over 100 Acres—Sections.



(Continued from page 731.)

The separated milk would be mechanically raised into the small TANK also fixed on the above platform, whence it would flow over the REFRIGERATOR into the delivery cans or milk vat.

By moving the ELEVATOR from the larger to the smaller tank the milk when brought into the Dairy after the evening milking can be at once refrigerated before being stored for the night.

The cream would be run into the cream cans and then poured into the CHURN, which would be of sufficient size to churn the cream produced at one operation, thus saving time and ensuring greater uniformity in the butter.

The BUTTER-WORKER is fixed conveniently adjacent, and is proportionate in size to the churn.

In front of the butter-worker is the MAKING-UP TABLE, which has a lattice shelf underneath for holding utensils.

This machinery is driven by a LINE SHAFT attached to the wall, so as to avoid vibration in the building likely to cause dust or injury.

The PUMP is driven by power from the shaft, and pumps the water from any adjacent well into the cold-water storage tank.

It would also be adapted to work by hand-power, so that when a small quantity of specially cold water is required it can be obtained direct from the well.

A WEIGHING MACHINE could be fixed, if it is desired to keep a record of the milk produced on the farm.

STORE.

This is lighted with a small window on the north side, and is the coolest portion of the building.

It is fitted with slate shelves, arranged at a distance from the wall for the circulation of air.

BOILER AND ENGINE HOUSE

is isolated from the Dairy, so that any escape of heat or smell into the same is prevented.

It is lighted by a window in the roof arranged to open.

It is provided with a boiler of 4-H.P. and an engine of 2-H.P., also coal storage, the coal being either delivered through the coal shoot as shown, or wheeled in through the door.

If extensive fodder machinery is used the power of the boiler and engine could each be increased 1-H.P.

SKIMMED MILK. Sufficient room is provided in the Dairy for portable cheese vat, curd mill, and press, for the manufacture of skim-milk cheese if preferred.

DAIRY CANS AND SUNDRIES would be as follows:—

12-gallon Cream Cans,	Scotch Hands,	Thermometers,
5-gallon Cream Can,	Rolling Boards,	Strainer,
Set Milk Measures,	Making-up Boards,	Milk Sieves,
16-quart Gauge Pails,	Set of Butter Prints,	Squeegee,
Temperature Can,	Pair 14lb. Galvanised	15-gallon Milk Cans
20-inch Oak Butter Tub,	Scales,	and Carriage,
Butter Scoops.	Set Galvanised Scales,	68-quart Milk Cans,
Butter Beaters,	7lb. Bar Weight,	Set of Testing Appara-
Butter Knives,	Lacto-butyrometer,	tus.

The cost of the Dairy Buildings would be £234 0 0

The cost of Machinery and Fittings, as described, including the Erection, would be 240 0 0

Total cost of the whole Dairy in complete working order, with Cans, Fittings, and Utensils 474 0 0

N.B.—If the glazed brick facings to interior of walls are omitted, the cost would be reduced by 39%.

Specification of Butter Dairy for Farm of under 100 Acres.

The Dairy shown on the Plan on page 738 is designed for a Dairy Farm of 25 to 30 cows.

BUILDING.

The building faces the north and consists of three rooms, and can be attached either to the dwelling or farm buildings if desired, the entrance being made either at the end of the Boiler House or at the end of the Dairy.

There is a lobby which serves to keep the other rooms clean and cool, and in the roof of which is fixed the cold-water tank.

[For details of *Walls, Roof, Floor, and Windows*, see Specification on page 731.]

VENTILATION.

The ventilation would be effected by the extracting flue C, which, being situated on side of smoke flue S, would be warmed by the latter, and thus an upward current always maintained, irrespective of wind and weather.

These ventilating flues would extract the air from the Dairy by the ventilator D, situated close under the ceiling so as to remove the warmest air, and in the store the inlet flue E, fitted with regulator, will provide fresh cool air from the north side, which will pass through the store and out through the opening F into the Dairy.

The *Boiler Room* will also be ventilated into the extraction flue B. The current will thus be maintained through all the rooms by the flues B and C.

If the local conditions are favourable, the fresh air for the inlet flue E could be brought through an underground culvert, so as to cool the air in transit.

HEATING AND HOT WATER.

Apparatus will be provided from the Boiler Room, and so arranged that in winter the building will be heated by hot-water pipes carried round the walls and regulated by valve. The one fire thus acts for the supply of hot water, and also for heating the apparatus in winter.

DAIRY.

The Dairy will be provided with a CHURN of about 12 gallons capacity, this being the largest size that can be easily worked by a woman.

The BUTTER-WORKER is proportionate in size to the churn.

In the front of the BUTTER-WORKER is the MAKING-UP TABLE, which has a lattice shelf underneath for holding utensils.

There would be a WASH-UP TROUGH in the corner as shown, fitted with DRAINER, and provided with Boiling and Cold Water.

A small REFRIGERATOR, with Tank, is also included.

Pump would be fixed against the wall, and would draw water from any adjacent well for the Cold Water STORAGE TANK.

It would also be fitted with a tap, so that when required a small quantity of specially cold water can be pumped direct from the well.

SETTING ROOM AND BUTTER STORE.

This is lighted with a small window on the north side, and is in the coolest portion of the building.

It is fitted with the requisite set of CREAMING APPARATUS, with cold water fittings and jackets, so that the pans are kept constantly cool.

Slate Butter Shelves are also provided, fixed at a distance from the wall for the circulation of air.

BOILER ROOM,

as previously mentioned, is fitted with combined Heating and Hot Water Apparatus, which supplies Boiling Water to the Wash-up Trough, and in winter likewise supplies the Heating Pipes to the building.

It is isolated from the Dairy, so that any escape of heat or smell into the same is prevented, and it is also lighted by a window in the roof, arranged to open.

Space is left for storage for coal, which, if access can be obtained to the back of the building, could be delivered through a coal-shoot in the wall, otherwise it would be wheeled in through the door.

VERANDAH.

This forms a pleasant adjunct to the Dairy, and is fitted with Bench for draining and sweetening the cans by exposure to the air.

DAIRY CANS AND SUNDRIES would be as follows:—

5-gallon Cream Cans,	Rolling Boards,	Strainer,
Milk Measures,	Making-up Boards,	Milk Sieves,
16-quart Gauge Pails,	Butter Prints,	Squeegee,
Temperature Can,	Scotch Hands,	15-gallon Milk Cans
Oak Butter Tub,	14lb. Galvanised Scales,	and Carriage,
Butter Scoops,	Galvanised Weights,	Set of Testing Apparatus.
Butter Beaters,	Lacto-butyrometer,	
Butter Knives,	Thermometers,	

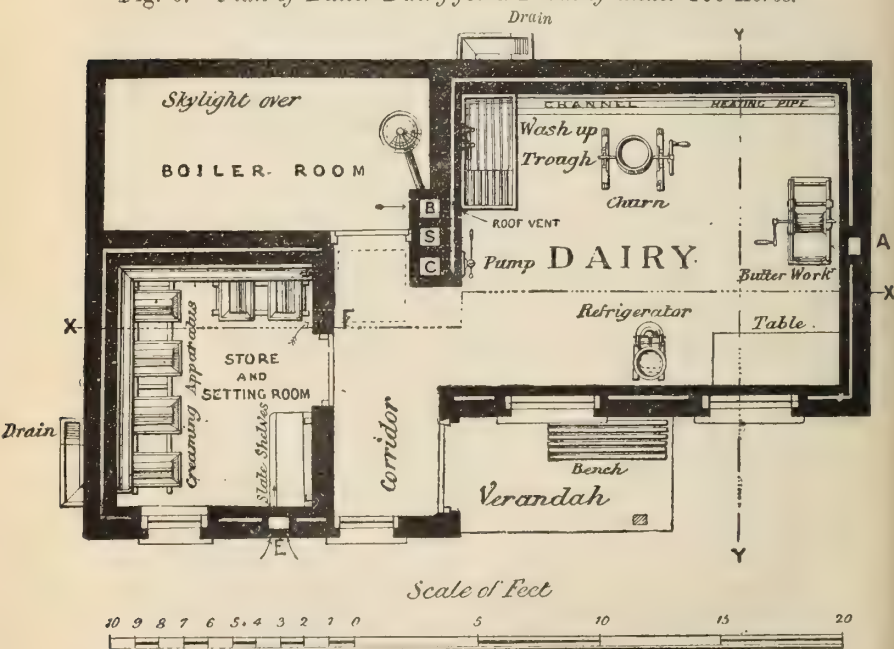
The cost of the Dairy Buildings would be £149 0 0

The cost of Machinery and Fittings as described, including the
Erection, would be 81 0 0

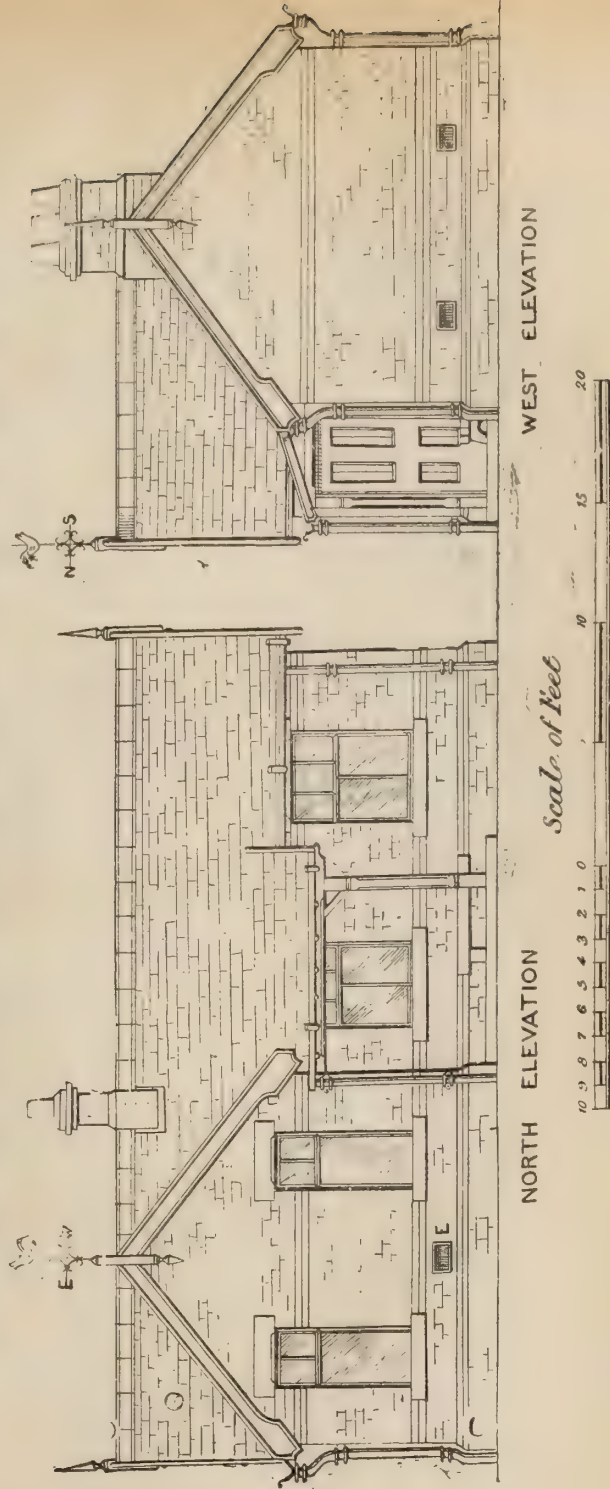
Total cost of the whole Dairy, in complete working order, with
Cans, Fittings, and Utensils 230 0 0

N.B.—If the glazed brick facings to the interior of the walls are omitted,
the cost would be reduced by 25*l*.

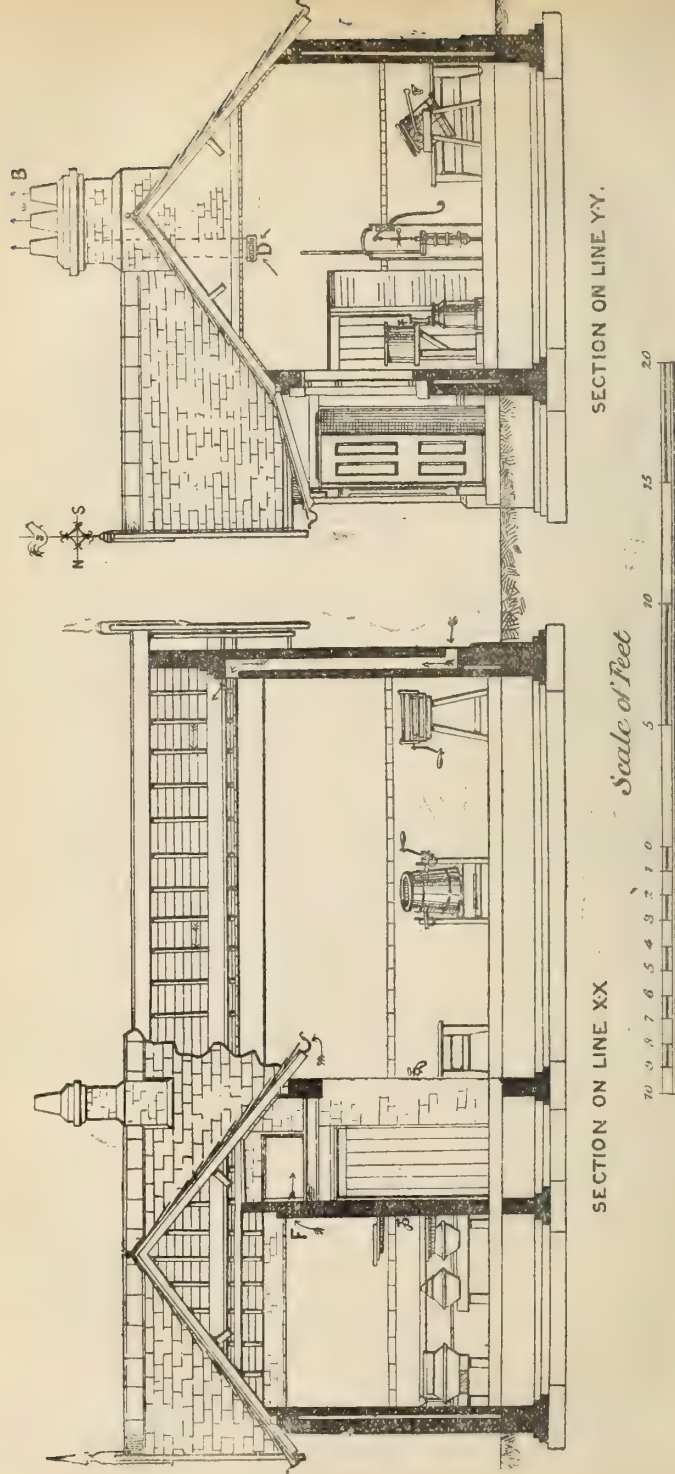
Fig. 6.—Plan of Butter Dairy for a Farm of under 100 Acres.



Figs. 7 and 8.—*Butter Dairy for a Farm of under 100 Acres—North (Fig. 7) and West (Fig. 8) Elevations.*



Figs. 9 and 10.—Butter Dairy for a Farm of under 100 Acres—Sections



POULTRY.

For five successive years poultry have formed a department of the Royal Show. At the Meeting of 1867, held at Bury St. Edmunds, prizes were, it is true, offered for poultry, but with the view rather to help in stopping the gap caused by the absence of cattle than with any permanent object. At the Preston Show of 1885 the Council resolved to "try the experiment" of a Poultry Show, and a prize list was arranged "specially with the object of making such a show beneficial to farmers as distinguished from fanciers." The result was that 325 entries (each comprising four birds) were received. In the following year at Norwich the entries dwindled to 191. The chief reason of this comparative failure was the large number of birds necessary to be sent. At Newcastle the prize list was altered, and an "entry" was restricted to a "cock and hen," instead of a "cock and three hens." The result was 405 entries. At Nottingham there were 343 entries, but the Council were still dissatisfied with the response made by exhibitors. At Windsor certain alterations were made, the most important being the adoption of the single bird system, and the addition of classes for table fowls and ducks. The number of entries more than doubled, the total being 861. Another improvement was effected in the arrangements for penning the birds, a lighter and more convenient form of pen being adopted. This was supplied by Spratts' Patent, and gave entire satisfaction.

The following are the reports received from the Judges of Poultry:—¹

Report of the Judge of Scotch Grey, Langshan, and Plymouth Rock Poultry, and of the Ducks, Geese, and Turkeys.

[Classes 300 to 303, 312 to 319, 342 to 349, 352 to 356.]

The several Classes of poultry which I have had the honour of judging at the Royal Windsor Show this year, comprising Scotch Greys, Langshans, Plymouth Rocks, the Waterfowl, and Turkeys, were exceptionally good, and some of the best specimens in the country of each variety were represented.

It is gratifying to find that the show throughout far exceeds any previous exhibition held under the Royal Agricultural Society, both as regards quality and quantity. This may in a great measure be accounted for by the praiseworthy adoption of suggestions thrown out in previous reports, such as single birds competing in each variety and sex, which is the case in

¹ Owing to the unfortunate ill-health of Mr. O. Ernest Cresswell, the Reporting Judge, it has not been possible to obtain from him in time for publication a detailed report on the Dorkings, Game, Hamburgs, and "any other breed" of Poultry—Classes 268 to 295, and 332 to 339.—ED.

all but the waterfowl this year, and if this classification is made universal throughout, I consider it would be a further improvement.

The adoption of the ordinary wire poultry pens will meet with very general approval, and the room and expense economised thereby must be very much to the Society's interest.

As to further improvements, I would respectfully suggest, in favour of better light, that the roof be composed of thinner canvas: the thick and dark coloured material used this year very much subdued this essential benefit to the Judges and public alike.

To facilitate the poultry judging and the public's early admission, I would recommend the Council to allow the ordinary judging books to be used, the duplicate slips of which are handed to the officials as each class is judged, to adjust the award tickets on the prize pens. The present system of reading out and booking the awards by the Judge, as each class is finished, causes considerable delay and is an unnecessary waste of time. After the Judges have completed their official duty, it seems to me that the existing rule and custom for each Judge to retire to the Awards tent, and there write out his awards on the prize sheets, and his report on the Classes, is quite right and proper, and should meet with every requirement, as it interferes with no one's time but his own.

I am greatly in favour of another point, which facilitates quick and uniform judging, and which is a general rule at poultry shows. This is for each Judge to act singly and independently. Nothing in my opinion occupies the time and delays the final issue more than when the opinions of two or more Judges acting conjunctively have to be consulted, and I have never seen uniformity in judging in any class of live stock where jury-judging is adopted.

Another point worthy of note is that the award tickets placed on the prize and commended poultry pens should not be of larger dimensions than 7 in. by 5 in., as the obstruction to the public view caused by larger cards is very inconvenient.

I heartily trust after this year's splendid display the Council will look on the poultry section with more favour and grant its continuance and encouragement. There is no question whatever that the exhibition will afford unbounded attraction, encouragement, and instruction, far exceeding the trivial outlay, and the most sanguine hopes of its promoters and well-wishers.

The four *Scotch Grey* Classes were not largely represented, but in the quality of the specimens little fault can be found. They are not much kept south of the border, which accounts for the limited numbers here, but I hope their graceful forms may attract many admirers and encourage their Southern cultivation. I can vouch for their useful properties.

The four *Langshan* Classes were represented by 61 exhibits. This variety has deservedly become a universal favourite, and the best specimens of the breed were shown in great force. They possess great size and beauty, are fleshy table birds, light in bone and offal, and are good layers of rich brown-shelled eggs. The chickens in this class were very forward, many of the cockerels were a large size already for the table, and some of the pullets were laying.

The four *Plymouth Rock* Classes numbered 59 pens. They were a very creditable lot, representatives no doubt from our most prominent breeders. The all-round useful properties of the Rock have established its popularity.

Most of the *Waterfowl* Classes were well filled. They were exhibited in pairs, but had liberal and additional prize money to the single birds allotted them. The prize pens of *Aylesburies* were good and typical, and the two Classes throughout, young and old, showed more purity of blood than I

have seen for some years; the Pekin cross, although distinctly visible in some of the specimens, is not so universal as it was.

The two *Rouen* Classes were disappointing in quality and numbers. Breeders of this variety are no doubt deterred from entering their specimens for exhibition on account of their bleached and somewhat unsightly plumage, caused by their first moult, which takes place at this season. But breeders should remember the seasons are impartial and serve all alike. The Rouens are not early layers, and the ducklings are far behind the young Aylesburys or the Pekins.

The two *Pekin* Classes are fair. Like the Rouens their old garments are assuming a worn-out appearance, and their bills are pale. A worse and more permanent fault, however, is their low and narrow skulls and horizontal carriage. The Aylesbury cross has done its worst for this variety. The Pekin is a good and early layer, and the ducklings in the young Class are very forward and well grown.

The old *Any other Variety of Duck* Class is a good one, and is represented by such useful varieties as the Cayuga, the Muscovy, the Patagonian, the White Crested Aylesbury, &c. The ducklings in this variety had only one pen of Cayugas forward out of three entries, to which I awarded a Second Prize only in lack of competition.

The *Gander and Goose* Class consisted of ten entries, all of the Toulouse breed, the prize birds being enormous in size and true in characteristic proportions, but, like all other waterfowl, at the present season they are full in moult, which greatly deteriorates from their appearance.

I would strongly urge the Council to provide three Classes for Geese, viz., one for Toulouse, one for any other variety, and one for goslings any variety. They are deserving of this encouragement. Breeders, too, I find, very seldom exhibit Embden and variety geese against Toulouse.

Turkeys had four Classes, the sexes competing separately.

The *Black or Bronze Cocks* numbered 14 entries, and without doubt were the best and most noble class in the Show. There was not one inferior specimen in the Class, and the winners were in very close competition. The same variety hens were also a good Class, but the winner here stood well out from the rest in size and quality.

In the two *Any other Coloured Turkey* Classes the exhibits were white, and very handsome birds they were. It is surprising that their cultivation is so limited.

D. BRAGG.

Report of the Judge of French, Brahma, Cochin, Minorca, Andalusian, and Leghorn Poultry.

[Classes 296 to 299, 304 to 311, and 320 to 331.]

The poultry in the whole of the Classes I had the honour to judge were, with very few exceptions, of good quality, especially considering the time of the year, when many birds are rough in plumage.

It being somewhat early for chickens, not many of the exhibits were sufficiently matured to form a proper estimate of their value; nevertheless some very good specimens put in an appearance, and well merited their honours.

The penning and attention to the exhibits were all that could be desired.

I strongly recommend "The Field" judging book, which is so very handy, the slips being torn out as each Class is judged, and handed to the Steward, the Judge retaining the counterfoil.

MATTHEW LENO.

Report of the Judge of Table Fowls and Ducks.

[Classes 340 and 341, 350 and 351.]

The above consisted of four Classes, one for pair of pure-bred fowls, one for pair of cross-bred fowls, one for pair of pure-bred ducklings, one for pair of ducklings of a first cross from any pure breed.

CLASS 340. *Pair of Fowls of any Pure Breed.*—This Class comprised 25 entries, principally of the Dorking breed. FIRST PRIZE: No. 714 (Mr. W. Stanford), pair of Dorking cockerels, first-rate quality, well fed, good colour and large. Far and away the best exhibit in the Class, and were a fair sample of the best Sussex fowls which command such high prices in London. SECOND PRIZE: No. 710 (Mr. H. Skilton), pair of Dorkings, good quality and well fed, smaller than No. 714. THIRD PRIZE: No. 713 (Mr. W. Stanford), pair of Dorkings. One of the fowls of this pair very good indeed, the other one was a little clung, or I should have given them second prize. RESERVE NUMBER 692 (Aylesbury Poultry Farm Co.), well grown fowls of good quality, but not fed sufficiently. HIGHLY COMMENDED: No. 696, very good pair of white Dorkings, but too forward; pullet had laid. HIGHLY COMMENDED: No. 708, pair silver grey pullets, very good-looking, very well fed, but too forward. One bird of this pair was a first-rate fowl, but the other one much too henny, otherwise I should have given them a prize. One bird laid in the Showyard.

Among the exhibits in this Class were Langshans and Indian Game, and the absurdity of the theory held by some writers who profess to be connoisseurs in table poultry was well illustrated when one compared the Langshans and Indian Game with the Dorkings. Although these two exhibits were undoubtedly very forward specimens, and the breeds to which they belong may be useful for crossing purposes on account of their hardiness, as pure breeds the long coarse black legs of the Langshans and the dry yellow carcase of the Indian Game cannot compete as table fowls with the Dorking. No. 695, a pair of coloured Dorkings, were not killed because the cock bird was deformed.

To my surprise I noticed in this Class a couple of small Andalusian cockerels. Whatever the other characteristics of this breed may be, it is totally unfit for table purposes.

The market value of the First Prize winners in this Class at Leadenhall Market at the time they were shown was 15s. per couple, that of the pair of Indian Game 9s.

CLASS 341.—*Pair of Chickens of a First Cross from any Pure Breed.* This Class consisted of 26 entries, but, with exception of three or four numbers, were nothing to compare to Class 340. No. 725, FIRST PRIZE (Mr. W. Cook), a pair of very fine chickens, cross between Dorking and Plymouth Rock. Quality very good, well fed, and good size, good colour. The largest fowl of the two had a very slightly curved breast bone, but nothing to affect its value, as if properly handled it would not be noticeable on the table. This pair of fowls won easily, being superior to all other entries in quality and size. No. 738, SECOND PRIZE (Mr. H. Skilton), large but indifferent quality, too forward. No. 718, THIRD PRIZE (Aylesbury Poultry Farm Co.), pair of pullets, Dorking-Indian Game. Serviceable fowls for market, but only medium quality. One bird torn in killing, which spoilt its appearance. Nos. 727 and 737 were passed on account of age.

The value of the First Prize winners at market on the day shown was 12s. the couple.

CLASS 350. *Pair of Ducklings of any Pure Breed.*—Thirteen entries. No. 809, FIRST PRIZE (Mr. E. Barnes), pair of first-rate Aylesbury ducklings, well fed and young. No. 816, SECOND PRIZE (Mr. J. W.

Hedges), similar pair of Aylesbury ducklings, very good, little difference between first and second. No. 817, THIRD PRIZE (Miss Mary Moore), large but no quality. Rest of Class indifferent.

CLASS 351. *Pair of Ducklings of a First Cross from any Pure Breed.*—No. 823, FIRST PRIZE (Mr. J. W. Hedges), Pekin-Aylesbury, very good indeed, quality and size both perfect. This was the best pair of ducklings in either Class. No. 824, SECOND PRIZE (Mr. J. W. Hedges), Pekin-Aylesbury, a similar pair to No. 823, equally first rate. Third Prize not awarded owing to the remainder of the Class being very inferior.

JOHN BAILY.

XXXIII.—*Report of the Steward of Farm Produce at Windsor.*
By CHARLES WHITEHEAD, F.L.S.

As it was desired that the Show of 1889 should be as extensive and comprehensive as possible, and that every branch of agriculture should be represented at Windsor, it was determined to offer prizes for all kinds of Farm Produce. At no previous Show, with the exception of the International Agricultural Exhibition at Kilburn, in 1879, had there been anything like a general display of all the productions of the farm, in connection with the Royal Agricultural Society; and previous to this recent Show at Windsor prizes had never been offered for corn, other than seed corn and malting barley.

In the very first year of the Society's existence Farm Produce was considered. Very handsome prizes were offered for seed wheat, viz., 50*l.* for 12 bushels of the best white wheat, and 50*l.* for 12 bushels of the best red wheat, at the first country Meeting of the Society, held at Oxford in 1839. The prize seed was to be sown by three farmers to test its qualities. The offers of prizes for seed corn were renewed at Cambridge (1840), Liverpool (1841), Bristol (1842), Derby (1843), Southampton (1844), and Shrewsbury (1845), where 60*l.* was given in prizes for wheat, barley, and oats. Since the Show at the last-mentioned place no prizes appear to have been offered for corn of any kind, until special prizes were offered at the instigation of the Seeds and Plants Diseases Committee in 1880 for new varieties of seed wheat. This competition was not, however, associated in any way with the Annual Show.

The next kind of Farm Produce to which the Council of the Society turned their attention in the days of its youth, was cheese in 1842, at Bristol, the fourth Show, at Derby, the fifth Show, and for some years afterwards. There was a very large show of cheese in 1858 at Chester, where a splendid prize list was competed for, amounting to 270*l.*, besides a champion prize

of 100*l.*, and 49*l.* for the dairymaids. These were given by the Local Society. At this competition there were no less than 181 entries of cheese. This was in the palmiest days of Cheshire cheese-making.

It is somewhat strange that encouragement should not have been given to butter-making until this same Chester Show in 1858, when 15*l.* was awarded in prizes given by the Local Committee. After this there were occasional competitions of butter for prizes given locally, but it was not until the Preston Show in 1885 that a substantial prize list was framed, and has since formed a part of the Society's programme. Prizes were offered for butter at Kilburn to the amount of 86*l.*, but this was then exceptional.

Wool was first shown at a Royal Show in 1846 at Newcastle, where prizes were given to the amount of 30*l.* Wool was shown at the Lincoln (1854), Warwick (1859), and Leeds (1861), Shows, and again at Newcastle in 1864, mainly in competition for prizes given by Local Societies or individuals. At Kilburn the prizes for wool amounted to 86*l.* for which the entries were numerous and on the whole satisfactory.

Hams and bacon were exhibited for the first time in 1877 at the Liverpool Show, but the prizes were given by Local Societies. At Kilburn the Society, in connection with the Mansion House Committee, gave prizes for hams and bacon to the amount of 180*l.* These liberal prizes failed to bring an adequate number of entries.

A new departure was made in 1882 at the Reading Show, in the shape of a fruit and vegetable exhibition. This did not prove successful, as the date of the Show was too early for most farm fruits, and farmers and market gardeners did not appear eager to compete in the vegetable classes, not having at that time realised that these are useful adjuncts to ordinary farm produce. No further attempt in this direction has been made since the Reading Show, not because the Council do not recognise the importance of fruit and vegetable growing, and the necessity for encouraging these productions, but because it is impossible that they can be exhibited in perfection at the end of June or the beginning of July.

Until the Kilburn Show, Cider and Perry did not figure in the prize schedule of the Society: not even at Exeter (1850), Gloucester (1853), Worcester (1863), Plymouth (1865), or Taunton (1875), all centres of fruit cultivation, was any encouragement given to this important industry. Mr. Michael Biddulph, M.P., gave all the prizes for cider and perry at Kilburn, amounting together to 75*l.* According to the report

of the Judges, this was not a very satisfactory exhibition, either of cider or perry.

Hops first appeared in the Society's programme at the Canterbury Show in 1860, when prizes amounting to 57*l.* were given by the Local Committee for Kent hops. In connection with the Kilburn Show in 1879, no less than 280*l.* was given in prizes for hops by a committee of hop growers and hop factors. At Windsor the prizes were offered by the Society for the first time.

For the first time in this country jam and preserved fruit makers were invited to compete for prizes at the Windsor Show in 1889. Jam-making has become such an important industry, and is so closely connected with fruit production, that it was deemed necessary to recognise it as a desirable adjunct to fruit farming, and to encourage its extension. The cheapness of sugar gives the English a great advantage over American and Continental jam-makers. Fruit comes to England in every form but that of jam, or preserve with added sugar. Fruit farmers in this country are becoming alive to the value of jam-making as a means of disposal of surplus fruit, or fruit that may be as a drug in a glutted market. Many have adopted it, some in a wholesale thorough manner, others in a small way. The whole business of jam and jelly making, and its collateral branches of fruit drying, evaporating, and preservation with and without sugar, may be considerably extended by the producers of fruit. It is felt that the action of the Council of the Society in giving this industry a helping hand by means of prizes for jams, jellies, preserves, and evaporated fruits, as well as for suitable machines for drying and evaporating fruits, was timely and judicious.

Honey may be considered as a farm product. It has been recognised by the Society as such since the Kilburn Show, where the exhibition of honey, bees, hives, and manipulation with bees, was most interesting and instructive. Since Kilburn there have been frequent similar exhibitions at the various shows, at which the entries and the interest have steadily increased. Prizes have not been given by the Society, though every opportunity of arranging their exhibitions has been afforded to the British Bee-Keepers' Association, by whom prizes have been offered.

CORN.

All competitions for corn in connection with the Society had previously been for seed corn, which involved a trial, and a consequent delay in adjudication. The results of such competi-

tions had not proved quite satisfactory, and it was decided to have an exhibition of all descriptions of Corn, with prizes for the samples of each kind respectively possessing the best qualities of colour, shape, weight, and other essential attributes.

It was suggested that prizes should be offered for the best new varieties of seed wheat; but though the importance of encouraging the production of varieties possessing novel and desirable characteristics is fully recognised by the Society, it would be impossible to award prizes without exhaustive trials of the merits of the new varieties, which would involve considerable time and labour. They must be tried, for instance, in different soils, in different localities, and during several seasons, in order to ascertain correctly their actual value as to their blight-resisting or wet-resisting power, and other specific qualifications.

This first show of corn held by the Society was on the whole satisfactory. The entries were large and the quality of many of the samples was very good, considering the character of the summer in which they were produced, the temperature of 1888 being low and the rainfall excessive. Some of the samples of white wheat were particularly fine for the year, with bright and plump grains.

There were twenty-six entries in the *White Wheat* class, of which six failed to put in an appearance. Nineteen entries were made of *Red Wheat*, with two absentees. On the whole the standard of this class was not so high as that of the former.

In the *Barley* competition there were nineteen samples entered and shown. In this class the injurious influences of the unseasonable summer were more palpable even than in the wheat classes, the exhibits being wanting in colour and quality. It is significant that of the best barley-growing counties Suffolk alone was represented, and the prizes went to Hertfordshire and Surrey, which are not especially reputed for the production of barley.

Of *Oats*, there were sixteen entries of white and eleven of black oats. The latter were much better than the former, which showed traces of the unpropitious season.

Large Beans were poorly represented, but of *Small Beans* there were ten samples of very fair character.

Of *Grey Peas* there were only four sacks shown. *Blue Peas* were better in number and quality.

There were altogether 120 entries of corn of all kinds, and 108 samples (sacks) were exhibited.

The following is the report of the Judge of Corn:—

Report of the Judge of Corn. [Classes 1 to 9.]

Taking into consideration the poor quality of the corn crop of last year, caused by rain and want of sunshine, the fact that corn keeps its condition worse than it has done for years past, and making allowance for the lateness in the year (farmers nearly always thrashing the best crops first), the grain shown at Windsor was quite as good as could be expected. The entries (120) were no doubt considerably below the number that would have been made in an ordinary season.

The show of *White Wheat* (26 entries) was very good. The FIRST PRIZE, taken by Mr. W. M. Tod, Weedon, Northamptonshire, was a very good lot of wheat, but was very closely run by the SECOND PRIZE, grown by Mr. John Overton, Sutton, Surrey—a very good specimen of Chidham. The quality of the *Red Wheats* was not so good. The FIRST PRIZE went to Mr. Thos. Vickress, Slinfold, Sussex, for a very useful lot of wheat. The SECOND PRIZE also went to Sussex, to the Pagham Harbour Co.

The *Barleys* were, as might be expected, very coarse generally. The FIRST and SECOND PRIZE sacks were in quality far before any others shown, and very nearly equal to each other; Mr. Richard Horwood, of Drayton Beauchamp, only just winning the FIRST PRIZE, whilst Mr. William Parrott, of Guildford, who won the SECOND PRIZE, almost tied with Mr. Horwood.

The FIRST and SECOND PRIZES for *White Oats* were taken by the Dowager Countess of Seafield, with two very fine samples of Scotch oats. Of *Black Oats* the show was good. The FIRST PRIZE went to Mr. C. D. Nicholson, Rotherham, Yorkshire, and the SECOND PRIZE to Mr. H. Penfold, Selsey, Sussex. Both samples were "Tartars." Mr. W. Springbett, Sulham, Reading, would have taken the First Prize in this Class had the sample shown been in condition, as, although rather thick in the skin, the oats were very black and large, grown from seed imported from Switzerland two years since.

Small Beans were a most excellent class, the FIRST and SECOND PRIZE exhibits and the HIGHLY COMMENDED exhibit all coming from Suffolk. The FIRST PRIZE sack, grown by Mrs. Maria Willis, Woodbridge, was an exceptionally fine parcel. The SECOND PRIZE exhibit, shown by Mr. Wm. Toller, and the HIGHLY COMMENDED, by Mr. Jas. Toller, were as nearly as possible equal, the former rather more even in size.

The *Grey or Mottled Peas* were not a very good class.

Blue or White Peas.—Mr. Jos. Topham, of Thorney, obtained the FIRST PRIZE for the best sample of blue I have seen this year; Mr. Watkin Jones taking the SECOND PRIZE with a good lot of white peas.

Should the Society continue the show of grain, and given an ordinary season, I think it would be of great interest to a very large number of agricultural visitors, and would lead to beneficial results.

R. HEWLINS.

WOOL.

The show of wool at Windsor was by far the largest that had ever been held under the auspices of the Society, and it is believed larger than any previous show of the kind in this country. The entries numbered 182, of which only six were unrepresented, as against fifty-one entries at Kilburn; and it may be said that the exhibition was a most admirable and

typical illustration of the wool-producing powers of this country. It is not necessary to make any further remarks upon this, as the Judges in their exhaustive report (given below) have treated of all the points of interest and instruction afforded by this magnificent display of brilliant fleeces.

Report of the Judges of Wool. [Classes 10 to 33.]

The exhibits of Wool, both in point of number and quality, were probably the best that have ever been seen as emanating from the agricultural section of the wool industry. Never before, to our knowledge, has there been such a thoroughly representative show of the wool of Great Britain as there was to be seen at Windsor. The exhibition was as interesting and instructive as it was extensive, and it is to be hoped that, in the interests of the wool trade, both agricultural and commercial, this will be the initiative of a new era of things as far as regards the attitude of agriculturists towards the growth of wool. The worthy example set by the Royal Agricultural Society should have a stimulating effect on wool producers throughout the country, which ought to show itself in succeeding exhibitions. The exhibits of wool, to the interested visitor, would convey both positive and negative lessons. In the positive sense, the excellence of some of the entries would no doubt be a surprise to some people as showing what good wool really is grown in this country; whilst the ignorance of what the desirable qualities are in wool, as shown by some of the exhibits, would prove the necessity of further education on the part of exhibitors, and would form the negative teaching. It would naturally be supposed that a competition of this kind would bring out the very best wools in each class; but we venture to assert that in some of the classes there is every day, in the ordinary course of business, better wool to be seen than any that was shown at Windsor. We do not shrink from giving particular instances of this below.

CLASS 10. *Leicester*.—The three prize lots in this class were very near together, and were a very good representation of the Leicester breed, being light, fine, and lustrous.

CLASS 11. *Border Leicester*.—The same remarks apply to this class, the first prize lot, however, being distinctly better than the rest of the class.

CLASS 12. *Cotswold*.—This was a very good show. No. 139, FIRST PRIZE; No. 140, SECOND PRIZE; No. 138, THIRD PRIZE; and No. 137, RESERVE and HIGHLY COMMENDED, were only placed in this order after very careful examination. All the lots in the class, or nearly so, were of a good type of Cotswold wool, being long, well-grown, and sound. This wool, in all its native purity, will always command a good market, and care should be taken not to spoil it with "foreign blood."

CLASS 13. *Lincoln* as a whole was poor. Many of the fleeces were weak in the staple, which seems strange in a wool which is celebrated for its strength and soundness. The purity of the lustre was, however, unexceptionable.

CLASS 14. *Oxfordshire Down* was a somewhat difficult class to judge. Whatever may be said of the sheep, the wool is classed as half-bred in the wool trade. There were one or two exhibits which were thought to have a very imperfect right to be in the class. The prize lots were, however, "regular" and good.

CLASS 15. *Shropshire*.—This was a very fine class, the FIRST (No. 163) and SECOND (No. 164) PRIZE lots being as good wool as any manufacturer could wish to see. The THIRD PRIZE (No. 174) lot was also good. The

only fault that could be found with the class was that some lots had been over-washed, soap and hot water having too evidently been used, which altered the natural characteristics of the wool.

CLASS 16. *Southdown*.—No. 184 was missing. The others were only a moderate lot.

CLASS 17. *Hampshire Down*.—Artificial washing also spoiled some of the lots in this class, which otherwise was a fair show.

CLASS 18. *Suffolk*.—It is a pity there were not more entries in this class, which is likely to take an important place in the wool trade of the future. The exhibits as a whole were good, but the FIRST PRIZE lot (No. 192) was a long way ahead of its competitors.

CLASS 19. *Somerset and Dorset Horned*.—The quality was good, but the quantity of exhibits was too small to show the many excellencies of this wool. We should like to have seen some true Dorsets among them.

CLASS 20. *Kent*.—Taken as a whole, this was the finest class in the Show, and required the nicest discrimination to fix the relative positions of the prize winners. We are afraid we did not quite understand what our privileges were, or we should have placed the letters "H. C." opposite a good many of the numbers. This class was a credit to the county, and would have puzzled a manufacturer to select from.

CLASS 21. *Devon Long Wool*.—These were all very good, and very near each other in merit.

CLASS 22. *Ryeland*.—Very poor, with the exception of the FIRST PRIZE lot, No. 230. This used to be a great breed in the olden time, but as far as wool is concerned the sooner it dies out the better, if these exhibits are to be taken as a fair sample. No. 225, THIRD PRIZE, would have stood a better chance if it had been washed in a "fair" manner. The breed of this lot of wool has probably been "improved."

CLASS 23. *Dartmoor*.—Both entries good; would have stood a good chance in CLASS 21.

CLASS 24. *Exmoor*.—All the entries were good of their kind, and quite distinctive.

CLASS 25. *Wensleydale*.—Nos. 245, 243, 246, and 247, were only just placed in that order, being very nearly equal in merit.

CLASS 26. *Roscommon*.—No entries, which was a pity. It would have done some of the English growers good to have seen a few good specimens of this wool.

CLASS 27. *Limestone*.—This class to a wool-user is meaningless. It may belong to several. The lots shown were good wool, and would have stood a good chance elsewhere.

CLASS 28. *Cheviots*.—Growers of pure Cheviot wool made a mistake not to turn up in greater force. What was shown, however, was very good.

CLASS 29. *Black-faced Mountain*.—The Eastern markets can supply us with millions of fleeces which are coarse and short, but very little which has the length and strength of the FIRST PRIZE lot shown here, No. 256. Hence our decision. Fineness in this wool is not looked for if there is a good length of staple.

CLASS 30.—*Herdwick* was a good show, in which the competition was close. Part of No. 265 was missing.

CLASS 31. *Lonk*.—The points which guided us here were length of staple combined with quality. The unsuccessful ones were more like *Cheviots*, having high quality for this class, but not sufficiently long and sound.

CLASS 32. *Welsh Mountain*.—This was a most excellent class. Nos. 279, 278, 282, 287, 280 were all first-class wools. No. 279 contained the finest fleece of British wool in the Show. Otherwise, the five lots above named were very near each other in merit.

CLASS 33. *Any other Breeds.*—The finest lot in the Show was undoubtedly No. 298, which was pure merino. If we had confined ourselves to fineness alone, No. 299 must have come in second. But in a wide class like this we felt bound to consider other excellent points. Unsuccessful exhibitors must make allowance for the impossibility of comparison in a wide Class like this. Some of the wools ought to have been shown in other Classes.

It might be as well if in future competitions it were stipulated that of the three fleeces shown one should be hog and two wether or ewe (*i.e.*, one first shearing and two second or later shearing), excepting in the case of wools of those Southern counties where it is customary to shear the lambs, in which cases all the three fleeces should be two or more shear fleeces.

It would also assist comparison if all the wools were shown "fleece washed"—*i.e.*, washed on the sheep's back—again with exceptions—to wit, the wools of Devon and Cornwall, which are usually clipped unwashed.

It cannot be too strongly insisted on that washing with warm water and soap or any alkali spoils the wool, and prevents it from being properly appraised.

JOHN W. TURNER.
EDWIN BREACH.

CHEESE AND BUTTER.

In the section for Farm Produce, prizes amounting in all to 25*l.* were offered for Cheese (Classes 34 to 43) and 39*l.* for Butter (Classes 44 to 47). As the exhibits in these classes came under the control of my colleague, the Steward of Dairying; his report should be consulted for particulars concerning them.

CIDER AND PERRY.

This exhibition was in two divisions:—

- I. *For fruit-growers and associations of fruit-growers only.*
- II. *For cider and perry manufacturers who are not growers of fruit.*

It was deemed desirable to make these divisions in order that the producers of apples and pears who make cider and perry of their produce, and many of whom are small farmers, should not be placed in competition with manufacturers provided with the most modern appliances. It is most essential to encourage the local manufacture of cider and perry in the Devonshire, Herefordshire, and Somersetshire villages, to afford profit to the farmers and work to the labourers.

In the first division 100*l.* was offered in prizes, besides a Champion Prize of 10*l.* The entries amounted to 64, made by 26 individuals. In the second division there were 28 entries from 11 individuals, for the 40*l.* offered, in four classes.

Without doubt the unfavourable summer of 1888 prevented the fruit from attaining perfection, and thereby injured the quality of the juice; but it is seen by the Judges' report that more care is required in selecting the fruit and in the manage-

ment of the juice afterwards, and it will be noted that they observe that some of the ciders made from fruit grown in 1888 were better than some from fruit grown in previous years. From the appearance of the cider and perry shown at Windsor, and from the Judges' remarks as to these, it is clear that the manufacture of these grateful drinks has not by any means arrived at perfection.

At the Kilburn Show in 1879 there were 41 entries. The Judges then did not praise the cider and perry exhibited.

Annexed is the report of the Judges :—

Report of the Judges of Cider and Perry. [Classes 48 to 61.]

We the undersigned, being the Judges of Cider and Perry at the Fiftieth Annual Exhibition of the Royal Agricultural Society held at Windsor, beg to report as follows :—

DIVISION I.—FOR FRUIT GROWERS AND ASSOCIATIONS OF FRUIT GROWERS ONLY.

CLASS 48.—*Cider in cask, not more than Thirty Gallons, made in the autumn of 1888, in District D, which comprises the counties of Berks, Cornwall, Devon, Dorset, Hants, Kent, Somerset, Surrey, Sussex, and Wilts.* Eleven samples were exhibited; of these four came from Devonshire and seven from Somersetshire.

CLASS 49.—*Cider in cask, not more than Thirty Gallons, made in the autumn of 1888, in District F, which comprises the counties of Gloucester, Hereford, Monmouth, Salop, Stafford, Warwick, Worcester, and South Wales.* Six samples were exhibited, and of these four came from Herefordshire, one from Worcestershire, and one from Gloucestershire.

CLASS 50.—*Cider in cask, not more than Thirty Gallons, made in the autumn of 1888, open to the rest of the United Kingdom.*—One sample only was exhibited, and this came from Norfolk.

CLASS 51.—*One Dozen Bottles of Cider made in the autumn of 1888, limited to District D.*—Eleven samples were exhibited; of these seven came from Somersetshire and four from Devonshire.

CLASS 52.—*One Dozen Bottles of Cider made in the autumn of 1888, limited to District F.*—Seven samples were exhibited; of these five came from Herefordshire, one from Worcestershire, and one from Gloucestershire.

CLASS 53.—*One Dozen Bottles of Cider made in the autumn of 1888, open to the rest of the United Kingdom.*—Three samples were exhibited; of these two came from Herefordshire and one from Norfolk.

CLASS 54.—*One Dozen Bottles of Cider made in any year before 1888, limited to District D.*—Eight samples were sent; of these five came from Somersetshire, two from Devonshire, and one from Dorsetshire.

CLASS 55.—*One Dozen Bottles of Cider made in any year before 1888, limited to District F.*—Six samples were exhibited, five of which came from Herefordshire and one from Gloucestershire.

CLASS 56.—*One Dozen Bottles of Cider made in any year before 1888, open to the rest of the United Kingdom.*—Five samples were exhibited, three of which came from Herefordshire, one from Norfolk, and one from Somersetshire.

CLASS 57.—*One Dozen Bottles of Perry, open to the whole of the United Kingdom.*—Six samples were exhibited, of which four came from Herefordshire, one from Gloucestershire, and one from Worcestershire.

DIVISION II.—FOR CIDER AND PERRY MANUFACTURERS ONLY, WHO ARE NOT GROWERS OF FRUIT (OPEN TO THE WHOLE OF THE UNITED KINGDOM).

CLASS 58.—*Cask of not less than Eighteen Gallons or more than Thirty Gallons, made in the autumn of 1888.*—Eight samples were exhibited, of which three came from Herefordshire, three from Devonshire, one from Somersetshire, and one from Norfolk.

CLASS 59.—*One Dozen Bottles of Cider made in the autumn of 1888.*—Eight samples were exhibited, of which three came from Herefordshire, one from Somersetshire, three from Devonshire, and one from Norfolk.

CLASS 60.—*One Dozen Bottles of Cider made in any year before 1888.*—Seven samples were exhibited, of which two came from Herefordshire, three from Devonshire, one from Somersetshire, and one from Norfolk.

CLASS 61.—*One Dozen Bottles of Perry.*—Five samples were exhibited, all of which came from Herefordshire.

In all ninety-two samples were exhibited, of which thirty-six came from Herefordshire, nineteen from Devonshire, twenty-three from Somersetshire, six from Norfolk, four from Gloucestershire, three from Worcestershire, and one from Dorsetshire.

We consider that the Cider and Perry exhibited, and which was made prior to the year 1888, was as a Class superior to that made in the year 1888, but this would be accounted for by the fact that the season of 1888 was unpropitious for the growth of apples and pears, and that in consequence the fruit did not attain that maturity and ripeness which are essential to the production of first-class Cider and Perry. On the other hand, some of the 1888 Ciders were in our opinion of better quality than those made prior to that year, both the Champion Prizes being awarded to a Herefordshire exhibitor for Cider in cask and bottle which had been made in 1888.

Some of the samples appeared to us to be out of condition and to show a great want of care in the making and management; and we think that if, generally, more care was taken by the growers in selecting the fruit, in seeing that it was sufficiently ripe for grinding, and in the general management afterwards, they would be able to realise better prices for their produce.

Considering the value of the prizes offered and the large area of the fruit-growing districts, we were somewhat surprised to find so few exhibitors, the whole number of samples sent, amounting to ninety-two, having been shown by thirty-five exhibitors only.

We deem it right to say that we were generally unanimous in our awards.

H. C. BEDDOE.
CHAS. W. TYLER.
F. J. HAYES.

HOPS.

Seeing that the prize-list for hops amounted to no less than 180*l.*, it must be said that the competition was not large nor adequate. Here, again, the weather of the summer of 1888 was undoubtedly the cause of this. No crop is so materially affected by wet and cold summer seasons as the hop crop. The whole yield of 1888 was of inferior colour and quality, so that many planters did not like to risk the reputation of their growths by showing hops of low colour, and lacking condition.

It was the same at Kilburn. The show of hops was limited on account of the cold summer of 1878, which in the words of

the Steward of Hops "materially tended to prevent hop-planters from entering samples, as, however good the management of hops may be in the oast-house, condition and colour cannot be imparted to them unless they have been grown under the influences of favourable weather; and those who grew their hops badly in 1878 did not choose to risk their reputation by showing blighted, mouldy, or rusty samples."

The show of hops at Windsor was, however, larger than that at Kilburn. There were 54 entries at Windsor, and 47 of English hops at Kilburn. It was larger than the show at Maidstone, in the heart of the hop-producing districts, in connection with the Bath and West of England Society in 1884, at which there were 47 entries. At the Royal Show in 1860 at Canterbury, another important centre of hop cultivation, there were only 30 entries. In short, the exhibition of hops at Windsor was the largest ever held in this country.

A question arose during the judging as to the right of a planter to enter more than one pocket in a Class. In two cases it happened that an individual planter had shown two pockets in one Class, which were distinctly the best, and the Judges appealed to the Steward as to the course to be adopted. As there was nothing in the regulations to prohibit planters from entering two or more pockets in a Class, it was held that the First and Second Prizes should be awarded to these planters.

The Council afterwards held that this decision was right; but it appeared, from correspondence with these planters, that in one case the two prize pockets were from the same "oasting," or parcel of dried hops, and were therefore identical. Upon a representation being made to this planter, he at once ceded the Second Prize to the Reserve Number. In the other case it was shown that the hops represented by the First and Second Prize pockets were from different oastings and different hop grounds; therefore these prizes were both retained.

It will be necessary in future hop competitions to have a regulation to meet this point, not, perhaps, preventing planters from entering more than one pocket in a Class, but requiring a declaration that the hops in each entry were grown in distinct grounds.

A short report from the Judges is appended here :

Report of the Judges of Hops. [Classes 62 to 67.]

We are of opinion that the Hop samples shown at Windsor were, probably owing to the unfavourable season of 1888, with a few exceptions, of inferior quality. Many of the pockets had been badly kept. We also think that, looking at the liberal prizes offered, the competition was small.

AMBROSE WARDE.
JOSEPH MATTHEWS.
JOHN NORWOOD.

JAMS AND PRESERVED FRUITS.

A large show in this department was not expected, at least in the First Division—open to Fruit-Growers and Associations of Fruit-Growers only. In the first place it was altogether novel, and the feeling that jam-making is beneath the dignity of farmers has not quite departed. In the Second Division—for Jam Manufacturers only—it was thought that there would be a goodly array of jars and glasses; but the competition was smaller by far than in the First Division, the large manufacturers being unrepresented.

The show, though small, proved very interesting, and was especially attractive to ladies. Many evidently careful housewives examined the various entries with keen eyes, bent on “getting a wrinkle” from the experts. During the judging, there was much excitement among the exhibitors and bystanders as to the results of the difficult and delicate task of decision, which seemed to indicate that this comparatively new enterprise of agriculturists is regarded with favour.

In the remarks of the Judge given below, he regrets the small competition, and expresses his opinion that “this is a branch of agriculture deserving more attention than it has received at the hands of British Farmers.” He also regrets that there was only one entry for Fruits preserved for dessert purposes. Cordial agreement is held with these remarks, but not with those as to Fruit Pulp. He says it is “a mistake to offer prizes in this Class, as jam, to be good, should be made from fresh fruit as soon as it is gathered.” Upon this it must be said that fruit pulps are not made, and are not required to be made, except at those times when there is a prospect of jam being superabundant, or when there is a glut of fruit, to preserve which a costly amount of sugar would be necessary. As fruit pulps may have to be kept some time before it is considered prudent to add sugar and make them into jams or jellies, it is important that they should be well made, and, above all, well kept. For these reasons, prizes for them were offered by the Society.

Report of the Judge of Jams and Preserved Fruits. [Classes 68 to 76.]

I regret that the prizes for Jams and Preserved Fruits have not produced more competition, as I am satisfied that this is a branch of agriculture deserving of more attention than it has yet received at the hands of British farmers.

In CLASSES 68 (*Jams in Pots*) and 70 (*Bottled Fruits*), although the exhibits are not so numerous as one could have desired, the quality of the articles shown is very good.

The same remarks apply to CLASSES 69 (*Fruit Jellies*) and 72 (*Dried or Evaporated Fruits for Cooking Purposes*).

With regard to CLASS 73 (*Fruit Pulps*), the quality is poor, and I am of opinion that it is a mistake to offer prizes in this Class, as jam, to be good, should be made from fresh fruit as soon as it is gathered. This fact is well illustrated in the present Show, as in Class 74 (for jam manufacturers only) the exhibits are not nearly so good as those in Class 68 (for fruit growers).

I am sorry to see only one candidate for the prizes in Class 71 (*Fruits Preserved for Dessert Purposes*), as this is a branch of the subject that has hitherto been quite neglected in Great Britain, and I am satisfied that with our facilities in the way of cheap sugar and cheap coal we ought to be able to beat our Continental neighbours in the production of crystallized fruit.

FREDERIC LAURENCE.

BEES, HIVES, HONEY, &C.

However energetically the "little busy bee" may work, it cannot store up good honey if the spring and summer months are not favourable for flowers and the development of sugary qualities. Fortunately for the Windsor honey exhibition the spring of 1889 was exceptionally fine and warm. It is said or sung:—

"A swarm of bees in May
Is worth a load of hay.
A swarm of bees in June
Is worth a silver spoon."

May, in this year, was unusually genial and swarm-inspiring. Many of the swarms from which the Windsor honey, so delicious and fragrant, was derived were, without doubt, evolved in April, also very warm and flower-productive, though April is not included in the poetic category of honey-making months, it may be, on account of rhythmic difficulties.

To those unacquainted with bees and their habits, it is curious to learn that sainfoin flowers do not make such good coloured honey as those of clover. Many, probably, also, do not understand the important services of bees in the fertilisation of plants. If this were their sole use, it would pay agriculturists over and over again to keep them; but there is the honey into the bargain, from which considerable profit may be made.

There were 152 entries of honey at Windsor, and 113 entries of hives and other appliances connected with bee management. At Kilburn, in 1879, there were only 59 entries, of which only 20 were of honey.

The Judges of Hives, Honey, and Bee Appliances, report as follows:—

Report of the Judges of Hives, Honey, and Bee Appliances. [Classes 77 to 98.]

The bee season of 1889, from its very marked contrast to that of last year, has afforded to beekeepers a favourable opportunity for proving the superiority of the modern system of beekeeping over that followed in years gone by.

Had so disastrous a season as that of 1888 occurred prior to the establishment of the British Beekeepers' Association and its kindred offshoots throughout the country, we are probably within the mark in asserting that not more than 20 per cent. of the bees in the United Kingdom would have survived. As it is, the loss since last year has been enormous; but, in the great majority of cases, it has arisen from causes quite plain to, and easily guarded against by, those who have made themselves acquainted with the principles of bee management on the modern system.

Nothing could have more clearly demonstrated the progress made in the method of managing bees than the fine display of honey shown at Windsor. Owing to the early date—so far as honey is concerned—on which the Show was held, the quantity of honey staged was as remarkable for its extent and completeness as for the rapidity with which it was gathered by the bees and prepared for exhibition. The number of honey exhibits more than quadrupled those of last year, and the quality was very good, especially in the Class for extracted honey. The Class for one lb. sections of comb honey was also fairly well filled, but the general appearance was not quite so attractive as we could have wished, owing to the fact that the larger portion of the exhibits was from sainfoin districts. Comb honey from this source, though excellent in flavour, has a yellow look not altogether pleasing compared with the delicate, creamy white of clover sections.

The occasion was made memorable by the visit of Her Majesty the Queen to the bee department, accompanied by the Prince of Wales and several other members of the Royal Family. Her Majesty was received by the Baroness Burdett-Coutts, President of the British Beekeepers' Association, and several members of the committee of that body, and it must have been very gratifying to these gentlemen when their chairman was enabled to offer, on behalf of the Association, for Her Majesty's acceptance, a fine sample of this season's honey in the form of a device from the prize collection, containing the initials of the Royal Agricultural Society, together with the words "Jubilee, '89" worked by the bees in honeycomb, and filled with beautiful sainfoin honey. The novel present was graciously accepted by Her Majesty, who seemed much interested and pleased with what she saw in the bee department.

Turning to the Bee Appliances, there was a falling off in the number of entries compared with Nottingham, only 96 exhibits being staged, against 123 at the latter place. Last year there were no less than ten entries in the Class for Collection of Hives and Appliances, and these in themselves made quite an imposing and effective display. At Windsor, however, only four collections were staged; the difference leading us to suppose there must be some objection on the part of exhibitors to the strict lines laid down in the schedule for their guidance. If this be so it is worth considering whether something cannot be done in future to encourage a larger entry in this important Class.

We were pleased to note a welcome change in the quality of the goods shown in Classes 80 and 81, for hives not to exceed in price 15s. and 10s. 6d. respectively. Last year hives were staged in these Classes worth far more than the value placed upon them, and the Judges did not fail to take note of the fact. This year we had no fault to find in this respect, and it gives

us pleasure to say that it was at no sacrifice of efficiency; some of the hives shown being superior for practical work to those shown at Nottingham.

On the whole, the Appliance Department, though not so well filled as last year, gave evidence that manufacturers are ever on the look-out for anything tending to facilitate work among bees, and excellent appliances for every purpose connected with bee culture can now be had at prices within the reach of all.

We cannot close this report without drawing the attention of farmers generally—or such of them as take an interest in bees—to the lesson taught by the past season. It has been conclusively shown that bees can be kept alive and in good health—no matter how bad the season may be—by any one who will give them a little of the care and attention required by any other kind of live-stock. On the other hand, it has been just as conclusively proved that bees, if left to shift for themselves at a time when no natural food can be had, will as surely die as sheep or other cattle would if left foodless and uncared for. When this simple fact is recognised and intelligently acted upon, the agriculturist will have as little dread of a bad bee season as the most skilled bee-keeper of the day.

W. BROUGHTON CARR.

WALTER MARTIN.

WILLIAM BUSH.¹

XXXIV.—*Report of the Steward of the Horse-shoeing at Windsor.*
By CHARLES CLAY.

THE Society having now, for the third year, placed the Horse-shoeing Department in my hands as Steward, it becomes my duty to present another report, to point out the salient features of the interesting contest at Windsor, and the result of offering prizes (for the first time) for systems not in common use (Class 3).

The number of entries was not equal to former years, being eleven in Class 1, draught horses; twenty-two in Class 2, harness horses; and seven in Class 3, new systems. Total, forty.

The work done by the competitors in Class 1 could not, I hope, be considered a fair specimen of the regular work of our shoeing smiths “within the area of the Metropolitan district and ten miles round Windsor.” If so, it would be desirable that all interested in horses should take steps to spread abroad some of the most elementary principles of horse-shoeing. Even the prizemen were not on some points up to the proper standard of efficiency, but the Judges did not feel justified in withholding any of the Prizes. In Class 2 the work was better, but even here there was much room for improvement.

¹ The fourth Judge of the Bee Department, Mr. Henry Yates, unhappily died before this Report was prepared.—[ED.]

The file and the rasp were in both cases used far too freely, the nails were often injudiciously placed, and many shoes were badly seated and worse forged.

The only prominent improvement on former years (and it is an important one) was the marked disuse of the knife. At last, I hope, by some means or other, these contests and the publication of our reports have succeeded in reducing the cutting away of the frog and the sole of the foot. In one or two cases before us even a little more removal of loose horn would have improved what was otherwise good work. Yet I would still impress upon the large majority of our smiths the necessity of limiting the use of the knife, and of wasting less time in filing up the shoes. A good black shoe well forged is far superior to a polished one, while the use of the rasp may with much advantage be still further curtailed and Nature be less interfered with.

The Judges' report appended gives more details on these points, and clearly indicates our unanimity of opinion.

As to Class 3, the Judges, with the assistance of two members of the veterinary staff (Professors Brown and Duguid), after very careful consideration, arrived at the following unanimous opinion, with which also, as Steward, I quite agree, viz. :

"In Class 3 there is not sufficient novelty nor merit in any of the exhibits to warrant the Judges in awarding a prize in this Class, or recommending them for general use, although under special circumstances some of them might probably be employed with advantage."

Two out of the seven entries did not put in an appearance, one being the nailless shoe. Two or three varieties of the Charlier shoe were brought to our notice, and these have no doubt some features well worth consideration. The advocates of the system will do well in the first instance to induce owners of young horses to *commence* shoeing them on this plan and never allow the frogs to be interfered with, and possibly much eventual good will result, particularly to our hunters and roadsters.

In addition to the entries, a very useful portable forge was exhibited by Mr. South, of New Bond Street. Perhaps the Implement Judges and Stewards might have more appropriately remarked upon this, but as an adjunct to my department I may just say that it seems a very handy contrivance for a country district where shoeing smiths are few and far between, as the whole apparatus—forge, bellows, and anvil—is fixed in a light pony-cart, and can be easily conveyed from farm to farm, do a day's or an hour's work, and be moved on to the next place.

As observed at the commencement of my report, this is the third year in which the Society has interested itself in the

question of horse-shoeing. It is too much to hope that in so short a time any serious impression upon the evils of horse-shoeing can be made. The fact of the Society being migratory in its annual exhibitions has as yet prevented the effect of these competitions being noticed and compared with former practice in any district. But the stimulus given to local societies, many of which have now taken up the matter and are giving prizes, must have a tendency to break down the many prejudices surrounding this question, and I hope the Royal Agricultural Society may see its way for some years to encourage these competitions, until every district has received a visit from their Judges.

Before closing this notice I would suggest that in my humble opinion the subject is now ripe for discussion by the veterinary profession. Would it be beyond their duties to take the lead, say together with the Farriers' Guild and others, in at least considering the advisability of forming a new society, to be called, I propose, *The Associated Society of Forge-Farriers*, who should grant certificates to competent men after full examination, in the same way as several other organisations have been instituted, with much advantage to themselves and the public? Such a body would, I feel sure, receive considerable support not only from the profession and the shoeing-smiths themselves, but from the public generally, and the certificated smiths would soon command the confidence of owners of horses throughout the country.

One of the greatest difficulties, I find, arises not so much from the forge-farriers as from the stupidity of grooms and men in charge of horses. The smiths say, "It is no use our shoeing horses as you wish us, and as no doubt they should be; the grooms will not have it; and if we do not do as they require, our work is condemned to their employers, and the horses taken elsewhere." Until, therefore, we arrive at some sort of a standard system of shoeing, and the farriers obtain certificates under which they may safely be allowed to use more independent judgment than now, it seems to me almost impossible to eradicate the present pernicious cutting, rasping, burning, and filing abominations.

Following the plan of last year, the Judges put a few questions of a simple nature as to the construction and names of the various parts of the horse's foot, and, as before, the replies were of the most confused character. Only in two or three cases were the answers in any way satisfactory, which again clearly points to a serious lack of the most elementary education on the anatomy of the foot—a requirement which I am warranted in stating has never been properly estimated by our

present forge-farriers, and it seems probable will never be so until necessity compels.

Report of the Judges of the Horse-shoeing Competitions.

The small number of the competitors was to be regretted, only eleven appearing in CLASS 1 and twenty in CLASS 2, and this was all the more surprising considering the liberality of the prize list and the area within which the competition was to take place.

Our instructions to the men consisted in stating the kind of shoes we desired made, and that they were not to hurry through their work, as the time test would only be taken into consideration, other things being equal; they were further required to fit and put on a fore shoe, and to make a hind shoe to be kept for inspection. Beyond these instructions they were very much left to themselves; no orders against cutting, rasping, or burning were given, as it was thought that within such enlightened areas as London and Windsor it would be hardly necessary to enjoin the men to abstain from such practices.

The detailed report which follows touches upon the various points on which we desire to lay stress, and we regret that so much still remains to be learnt by men who probably consider themselves fully competent to deal with the horse's foot. The *vivâ-voce* examination acts beneficially by bringing to light the men who take something more than a routine interest in their calling, but that so much haziness should still exist amongst those capable of reading for themselves is very inexcusable. We would beg to suggest that the Society issue anatomy plates at a cheap price, so that they could be hung in the forge or in their homes; also that models or specimens of the foot be on view during the examination; and again that the competition have a time limit, say, of 35 minutes.

In a competition of this kind it is not often that the farriers have had such complete arrangements made for their comfort, everything that could be thought of being provided for them by our most excellent and energetic Steward, to whom, and to his Assistant, we owe our very best acknowledgments for their kindness and courtesy during the period of our work at Windsor.

CLASS 1. *Draught Horses*.—In the majority of cases the shoes were torn off after knocking up the "clenches," no effort being made to draw the nails singly.

Very little preparation or dressing of the feet was undertaken, the drawing knife being conspicuous by its absence, which, although a very desirable advance on the old system of paring and trimming, can perhaps be carried to the other extreme.

The fitting was not at all well done, daylight between the foot and the shoe being the rule rather than the exception; and this was all the more inexcusable as some of the shoes were fitted too hot, being kept in position longer than was necessary to indicate the "bearing" of the shoe.

As a rule the nails were well and evenly driven, but in two or three feet they were placed much too high.

The rasp was excessively employed on the outside of the crust in finishing off.

The hind shoes kept for inspection were very rough, and many were very indifferently stamped; in some the stamping being too close together, in others, being carried back too near the heel. The fore shoes were very generally "seated" out too much, as in some it was noticed that the outer edge only of the shoe was in contact with the foot, leaving the shanks of the nails visible when the foot was lifted for inspection.

Time was lost by several of the competitors in "filing" up the shoes, an unnecessary waste of labour, in the case of draught horses at least.

In the *viva-voce* examination on the simple anatomy of the foot great ignorance was shown by the majority of the competitors.

Time occupied: longest, 51 minutes; shortest, 24 minutes; average, 36½ minutes.

CLASS II. *Harness Horses*.—Here again, in only isolated instances did the men attempt to draw the nails prior to the removal of the shoe.

In preparing and dressing the feet, in only one case was the drawing knife used to excess, the men erring on the side of doing too little rather than too much.

The "fitting," speaking generally, was either carelessly or too rapidly carried out; in only a few was a proper bed secured for the shoe, and this often at the risk of burning the foot to too great an extent.

The nails were evenly driven, but not always well distributed; in many cases the heads of the nails were not properly buried in the fullering, and the number was not sufficient in several of the feet considering their size.

The rasp was brought into very constant requisition to rob the crust and to bring it down into apposition with the edge of the shoe—a most pernicious system.

Several very good "firemen" appeared in this competition; but, speaking generally, the best mechanics were not necessarily found to be the best all-round men. The hind shoes kept for inspection were not all that could be desired, and owing to the quality of the iron ("hollow") many were "ripped."

Some of the shoes were fitted much too wide and too long in the heels, and a few were very much "sprung" at this point.

In the *viva-voce* examination two of the farriers answered particularly well, the majority showing better form than in Class I.

Time occupied: longest, 40 minutes; shortest, 27 minutes; average, 31 minutes.

JOHN BELL.

E. E. BENNETT.

XXXV.—Quarterly Reports of the Chemical Committee, 1889.

APRIL, 1889.

1. Mr. W. Hipwell, of Hillside, Sharnbrook, Bedford, sent for analysis two samples of linseed-cake—the first on July 31, 1888, the second on August 31. On these respectively Dr. Voelcker reported as follows:—

	Aug. 8, 1888.	Sept. 6, 1888.
	A.	B.
Moisture	12·72	12·84
Oil	12·40	12·03
¹ Albuminous compounds (flesh-forming matters)	24·25	23·75
Mucilage, sugar, and digestible fibre	33·39	30·87
Woody fibre (cellulose)	7·07	8·13
² Mineral matter (ash)	10·17	12·38
	100·00	100·00
¹ Containing nitrogen	3·88	3·80
² Including sand	4·49	7·14

"This Cake ('A') is an impure one, containing $4\frac{1}{2}$ per cent. of sand; it has, further, admixture of starchy materials, and appears to me not made from good sound seed."

"J. AUGUSTUS VOELCKER."

"This Cake ('B') has a very large amount of sand, and is thus not pure."

"J. AUGUSTUS VOELCKER."

After repeated applications for particulars, the following reply was received from Mr. Hipwell:—

"Hillside, Sharnbrook, Bedford: November 15, 1888.

"SIR,— You request a reply to your former inquiries. I am unable to find your paper, which was laid aside at the time and forgotten to be replied to. As your information answered my purpose at the moment, and I saw the manufacturer, who assured me of the *bona-fides*, the sand being always present from the gathering of the linseed, I did not trouble further about it.—Yours faithfully,

"W. HIPWELL."

In answer to this Dr. Voelcker wrote:—

"November 21, 1888.

"DEAR SIR,—

Linseed-Cakes 1366 and 1423.

"I send you fresh papers to fill up. I hope you will not allow yourself to be misled by such representations as the manufacturers appear to have made with regard to the presence of sand in the cakes. Sand to the extent of what occurs in these cakes arises from culpable carelessness or intentional adulteration.—Yours faithfully,

"J. AUGUSTUS VOELCKER."

Finally Mr. Hipwell wrote, on January 10, 1889, that he did not wish to take any steps in the matter.

2. Mr. Edward Broughall, of Wikey House, Ruyton XI. Towns, Salop, sent for analysis on November 2, 1888, a sample of linseed-cake, upon which the following report was made:—

"November 7, 1888.

Moisture	13.75
Oil	10.23
¹ Albuminous compounds (flesh-forming matters)	18.69
Mucilage, sugar, and digestible fibre	42.07
Woody fibre (cellulose)	7.57
² Mineral matter (ash)	7.69
	100.00

¹ Containing nitrogen 2.99

² Including sand 2.85

"A very impure cake.

"J. AUGUSTUS VOELCKER."

This cake, it will be noticed, is exceptionally low in nitrogen, the consequence of a great admixture of starchy materials. Four tons of this cake had been purchased, on the strength of a good report, through agents, at 7*l.* 12*s.* 6*d.* per ton delivered. Dr. Voelcker having adverted to the absence of the word *pure* from the invoice; Mr. Broughall wrote:—

"November 26, 1888.

"DEAR SIR,—I had no guarantee as to the purity of this cake; I am afraid we agriculturists as a class are careless in this respect.—Yours truly,
"ED. BROUGHALL."

3. Mr. Thomas Jenks, of Orton, Wolverhampton, sent for analysis on October 18, 1888, a sample of linseed-cake, of which he had purchased 4 tons at 7*l.* 10*s.* per ton. The analysis and report were as follows:—

"October 23, 1888.

Moisture	13.94
Oil	8.93
¹ Albuminous compounds (flesh-forming matters)	18.66
Mucilage, sugar, and digestible fibre	38.72
Woody fibre (cellulose)	8.97
² Mineral matter (ash)	10.78
	100.00
¹ Containing nitrogen	2.98
² Including sand	6.55

"This is the worst cake I have seen for a long time. It has no right to be called linseed-cake at all.
"J. AUGUSTUS VOELCKER."

When urged to communicate the names of the manufacturers and others concerned in supplying farmers with such an article, Mr. Jenks wrote:—

"December 1, 1888.

"DEAR SIR,—With respect to your inquiry as to linseed-cake No. 1512, the agents from whom I bought the cake communicated with the maker. They at once asked me to return cake, they paying carriage and sending me another lot of cake, of which I enclose you a sample for analysis.

"Should your report of this lot be favourable, out of sympathy for the agent, who in these cases suffers from the publicity although often quite blameless, I do not feel inclined to proceed further in the matter.—Faithfully yours,
"THOS. JENKS."

A sample of the new lot of cake was accordingly analysed, with the following result:—

"December 6, 1888.

Moisture	13.31
Oil	11.33
¹ Albuminous compounds (flesh-forming matters)	22.69
Mucilage, sugar, and digestible fibre	34.71
Woody fibre (cellulose)	10.21
² Mineral matter (ash)	7.75
	100.00
¹ Containing nitrogen	3.63
² Including sand	2.70

"A very impure cake, containing a great deal of admixture. It is very low in nitrogen, and has a bitter taste.
"J. AUGUSTUS VOELCKER."

Notwithstanding this report, Mr. Jenks would not give the particulars; but wrote in reply:—

"March 9, 1889.

"DEAR SIR,—In reply to your letter of the 3rd, I am sorry that in this instance I cannot supply you with particulars; a very considerable allowance was made me, although the original price was very low, and the agent who sold it was a very old friend of mine and only commenced selling cake this season, and I am sure was quite unaware that the cake was so inferior; and, this being the case, I do not feel justified in injuring the trade of a young beginner.

"I now guard against a repetition of this, and always inform the seller that I may have the cake analysed, and, if impure, give you all particulars.
—Yours faithfully, "THOS. JENKS."

A reduction of 1*l.* per ton was made.

4. Mr. Samuel Egar, of Wryde House, Thorney, Peterborough, sent on November 29, 1888, for analysis a sample of linseed-cake purchased from the manufacturer, Mr. William Gray, Oil Cake Mills, Wisbech. This represented a 3-ton lot, forming part of a contract, dated July 26, 1888, for "15 tons 95 % Linseed-cakes @ 7*l.* 10*s.* per ton, to be delivered Wryde Sta. in 3-ton lots September to December 1888. Terms cash monthly." The delivery was invoiced accordingly as "95 % Linseed-cakes." Dr. Voelcker's analysis and report were as follows:—

"December 6, 1888.

Moisture	13·29
Oil	11·91
¹ Albuminous compounds (flesh-forming matters) .	24·63
Mucilage, sugar, and digestible fibre . . .	33·11
Woody fibre (cellulose)	8·51
² Mineral matter (ash)	8·55
	<hr/>
	100·00
¹ Containing nitrogen	3·94
² Including sand	3·50 "

Dr. Voelcker reported that this was an impure cake, with admixture of foreign seeds, and was made from unsound or damaged seed.

On December 18, Mr. Egar sent another sample taken from a later delivery under the same contract, the cake being likewise invoiced "95 % Linseed-cakes." Upon this the following report was returned:—

"December 22, 1888.

Moisture	13·75
Oil	13·33
¹ Albuminous compounds (flesh-forming matters) .	23·38
Mucilage, sugar, and digestible fibre . . .	33·34
Woody fibre (cellulose)	8·19
² Mineral matter (ash)	8·01
	<hr/>
	100·00
¹ Containing nitrogen	3·74
² Including sand	2·30

"A cake made from damaged seed, and not as well screened as it should be.
"J. AUGUSTUS VOELCKER."

Mr. Egar wrote on February 1, 1889, stating as follows the result of his complaining to the vendor:—

"Replying to yours of January 15. On my complaint the vendor stated he found on inquiry the screen was neglected by the attendant. Not properly cleaned for some (days?) just at the time they were making my cakes, for which he proposed to make an allowance. We settled the matter after I had reminded him it was unfortunate the screen got out of order on two occasions when my cakes were being made, the deliveries being October and December."

The matter was finally settled with Mr. Gray by a payment of 60*l.* for 8½ tons delivered to date, being a deduction of 3*l.* 15*s.* on the purchase.

5. Mr. W. H. Wykes, of Weston Park, Shipston-on-Stour (agent for the Countess of Camperdown), sent on December 7, 1888, a sample of linseed-cake, to obtain an opinion as to its purity. Five tons of this had been purchased on November 24, at 8*l.* 10*s.* a ton, delivered to station from Hull.

After examination Dr. Voelcker gave his opinion that the cake was "a decidedly impure one."

Mr. Wykes then explained (December 10) that he had not in the present instance obtained any guarantee of purity from the manufacturers, "having hitherto been satisfied with their cake, which had always been sold to him as a pure cake." At his request a full analysis was then made, with the following result:—

"December 18, 1888.

Moisture	14·07
Oil	9·10
¹ Albuminous compounds (flesh-forming matters)	21·20
Mucilage, sugar, and digestible fibre	38·10
Woody fibre (cellulose)	8·60
² Mineral matter (ash)	8·93
	<hr/>
	100·00
¹ Containing nitrogen	3·39
² Including sand	4·19

"The cake contains, as you see, over 4 per cent. of sand; it has besides much admixture of starchy substances and foreign seeds, and is an impure cake.

"J. AUGUSTUS VOELCKER."

On Mr. Wykes's complaining, the manufacturers wrote to him as follows:—

"To W. Wykes, Esq.

"Hull: January 5, 1888.

"DEAR SIR,—Your letter to Mr. — re last lot of linseed-cakes arrived in my absence on journey. I am sorry you are so much dissatisfied with it. I pay very little attention to Voelcker's analyses; they are not a

guide to arrive at a value upon cakes. Our ordinary linseed-cakes are made from half fine linseed and half common, as imported, and the common seed often contains an admixture of tares and wheat, only very slight, and may be a trifle dusty; but as for sand, *there was not a particle in it.* I could give you case after case where Voelcker's analyses have differed very much on this point, and a linseed-cake that contained 72 per cent. feeding matter is much above the average. We should be pleased to supply you with some of our 95 per cent. guaranteed linseed-cakes, they are made from our finest linseed *double screened.* I assure you we have sent out a large quantity of the same quality of cake that was supplied to you, and we have not had a single complaint except yours. Trusting that my explanation will be satisfactory to you, and that you will continue your support to us through our Mr. _____,
I am, dear sir, yours truly, "_____."

"The cakes sent you did not leave us 3s. per ton margin."

Mr. Wykes having determined to have no further transactions with the firm, no allowance was applied for.

6. Mr. A. Pentelow, of Papworth St. Agnes, St. Ives, Hunts, sent for analysis on January 23, 1889, a sample of what was sold to him as Maize Germ Meal. Four tons of this had been purchased from the manufacturers, Messrs. Hamilton & Co., 118 High Street, Wandsworth, S.W., through their district agent, Mr. R. J. Kisby, Croxton, St. Neots, Hunts. The price was 7*l.* per ton (15*s.* allowed off agent's commission on the lot), cash on delivery, purchaser paying carriage.

The following is taken from Messrs. Hamilton's circular:—

"SUPERIOR MAIZE GERM MEAL.

"Containing 16 per cent. of oil; 11 per cent. albuminoids; mucilage, starch, sugar, &c., 50 per cent. This is a most valuable feeding meal, and largely used. Superior to any in the market. Price 7*l.* per ton, bags included. Free on rail in London."

The meal was invoiced as "Maize Germ Meal at 7*l.* per ton." Dr. Voelcker's analysis and report were:—

"January 28, 1889.

Moisture	10.91
Oil	10.61
¹ Albuminous compounds (flesh-forming matters)	10.31
Mucilage, sugar, and digestible fibre	55.05
Woody fibre (cellulose)	7.53
² Mineral matter (ash)	5.59
	100.00

¹ Containing nitrogen 1.65

² Including sand 1.68

"This is a material that has no right to be called Maize Germ Meal. It is an adulterated sample, and largely composed of rice meal—a decidedly inferior and very much cheaper material. The analysis is also considerably below the guarantee.

"J. AUGUSTUS VOELCKER."

Upon receiving this, Mr. Pentelow wrote, in explanation of the transaction:—"After seeing the analysis on the price list, I bought 4 tons of Mr. Kisby at price stated above. A few days after delivery, finding my stock did not care for the meal, I wrote him, asking him to come and see a sample taken out of bulk on a certain day, to be sent for analysis. Not coming, I took a sample in the presence of my yard-man, keeping a sample myself."

Messrs. Hamilton & Co. asked Mr. Pentelow to send them a sample of the meal, and subsequently wrote on February 12 as follows:—

"DEAR SIR,—We duly received yours of the 4th inst. with sample for which we are obliged. We have carefully investigated the matter, and have ascertained, without doubt, that a particular meal specially prepared for another customer was sent you in error. Owing to the bags not being distinctly marked, the meal sent was a mixture of Maize Germ and the very best London-made rice meal. The difference in cost to us is only a few shillings, but as we are desirous of meeting you fairly in the matter, we are willing to make you a reduction of 1*l.* per ton, which is the most we can do. Upon receipt of your cheque for 24*l.* we will send a receipt in full. Trusting this will be satisfactory.—We are yours faithfully, "HAMILTON & Co."

7. Mr. Jas. Bennett, of South Dean, Tillington, Petworth, sent on February 8, 1889, a sample of linseed-cake for analysis. Two tons of this had been purchased; the description on the invoice was simply "linseed-cakes," the price being 9*l.* 10*s.* per ton, carriage paid. The result of Dr. Voelcker's analysis was:—

		February 21, 1889.
Moisture		11.92
Oil		8.80
¹ Albuminous compounds (flesh-forming matters)		28.43
Mucilage, starch, and digestible fibre.	}	43.52
Woody fibre (cellulose)		
² Mineral matter (ash)		7.33
		100.00
¹ Containing nitrogen		4.55
² Including sand		2.39

"Not a pure cake—it contains a great deal of foreign seeds, among which hemp is *specially prominent*, and also very much starchy admixture, in which rice figures largely.

"J. AUGUSTUS VOELCKER."

Mr. Bennett understood that he was being supplied with the manufacturers' "best make," but had omitted the precaution of accepting only such cake as was guaranteed *pure*, and invoiced accordingly. Not finding his sheep progressing favourably, Mr. Bennett sent the cake for analysis.

8. Mr. T. Coulson, of Langton, Malton, sent on February 6, 1889, a sample of linseed-cake for analysis. He had been feeding beasts with this cake, and they had been taken ill, as well as some milking cows. Upon analysis the cake gave the following results:—

“February 21, 1889.

Moisture	15.29
Oil	11.13
¹ Albuminous compounds (flesh-forming matters)	25.94
Mucilage, sugar, and digestible fibre	31.19
Woody fibre (cellulose)	9.67
Mineral matter (ash)	6.78
	100.00

¹ Containing nitrogen 4.05

“The linseed-cake is very impure indeed; it contains an extremely large admixture of other seeds, notably rape, spurry, and hemp. Also it has a great deal of starchy matters. It is a cake I should not think of using.

“J. AUGUSTUS VOELCKER.”

This cake was bought as a second-class cake, price 7*l.* 10*s.* per ton in Hull. After the report it was exchanged for 95 per cent. pure cake.

9. On August 24, 1888, Mr. R. A. Graves sent, on behalf of Miss Adelaide Watt, Speke Hall, near Liverpool, a sample of linseed-cake for analysis. This was taken from a 1-ton lot, bought in Liverpool. The cake was invoiced, “A Qty $\frac{1}{2}$ Pure Lins. Cake,” the price being 6*l.* 10*s.* per ton, at stores. Dr. Voelcker’s analysis and report were:—

“August 31, 1888.

Moisture	14.29
Oil	12.77
¹ Albuminous compounds (flesh-forming matters)	24.31
Mucilage, sugar, and digestible fibre	30.87
Woody fibre (cellulose)	7.97
² Mineral matter (ash)	9.79
	100.00

¹ Containing nitrogen 3.89

² Including sand 4.75

“This cake has a good deal of sand, and consequently is not pure.

“J. AUGUSTUS VOELCKER.”

On complaint being made, the vendors said that it was in their opinion quite impossible to get linseed-cake perfectly pure; but that they fancied that the cake supplied was, commercially speaking, quite pure—that is to say, made of seed as imported, but not as free from sand as some of the more expensive cakes. They subsequently expressed their willingness to meet Mr. Graves in the matter, which was ultimately settled by a deduction of 10*s.* on the ton.

10. Mr. E. W. Ward, of Crickheath, Oswestry, forwarded on February 12, 1889, a sample of linseed-cake, sold to him as pure, costing 9*l.* 2*s.* 6*d.* per ton delivered. The analysis of this was :—

		" February 21, 1889.
Moisture	. . . . .	12·75
Oil	. . . . .	13·47
¹ Albuminous compounds (flesh-forming matters)	. . . . .	21·38
Mucilage, sugar, and digestible fibre	. . . . .	34·50
Woody fibre (cellulose)	. . . . .	7·36
² Mineral matter (ash)	. . . . .	10·54
		100·00
¹ Containing nitrogen	. . . . .	3·42
² Including sand	. . . . .	5·80

"An impure cake, having nearly 6 per cent. of sand, besides a great deal of starchy admixture and seeds of polygonum. In consequence the nitrogen is very low.

"J. AUGUSTUS VOELCKER."

Mr. Ward said he had only purchased one ton, being persuaded to try it by a friend. He refused to give more particulars.

JULY 1889.

The Committee call attention to a new form of adulteration of linseed-cake. This consists in the use of the refuse from saccharine manufactories, which refuse is mixed with the linseed and crushed along with it. The presence of this adulterant is recognisable by the higher percentage of mineral matter (ash) in cakes which contain it, and this ash on examination is found to consist largely of sulphate of lime (gypsum).

1. Mr. W. Grundon, of Grimthorpe, Pocklington, Yorkshire, sent on February 13, 1889, a sample of linseed-cake, representing a two-ton lot purchased at 9*l.* 10*s.* per ton, carriage paid (5*s.* discount for cash in a month), from Messrs. Robert Stephenson & Son, Hull Bridge, Beverley, who were the manufacturers. Mr. Grundon stated that the order was given for two tons of pure linseed-cake. Formerly the manufacturers had branded their cake "Pure"; but recently, owing to the Merchandise Marks Act, they ceased to do so; at the same time they stated that they should continue to supply linseed-cake of the first quality and purity. Mr. Grundon accordingly wished to be informed whether what was now supplied to him was pure linseed-cake of the best quality. The following analysis was returned :—

"February 21, 1889.

Moisture	13.08
Oil	12.70
¹ Albuminous compounds (flesh-forming matters)	27.31
Mucilage, sugar, and digestible fibre	32.52
Woody fibre (cellulose)	8.00
² Mineral matter (ash)	6.39
	<hr/>
	100.00
¹ Containing nitrogen	4.37
² Including sand	1.65

"A decidedly impure cake, having very considerable admixture of foreign seeds and starchy bodies.

"J. AUGUSTUS VOELCKER."

Mr. Grundon complained to the makers, and a lengthy correspondence ensued, from which are taken two letters from the makers, and Dr. Voelcker's reply to Mr. Grundon.

"W. Grundon, Esq.,
Grimthorpe, Pocklington.

"Robert Stephenson & Son,
Hull Bridge Mills, nr. Beverley :
March 7, 1889.

"DEAR SIR,—We are in receipt of your cheque, value 18*l.* 10*s.*, for which we thank you. You remark that our cakes are not branded pure, nor are they invoiced as such. The Merchandise Marks Act put an end to that. Supposing a parcel of seed to contain 95 per cent. pure linseed, when the oil is extracted from it the percentage of purity is decreased, whilst the 5 per cent. impurity remains, causing the percentage of impurity in the cake to be relatively higher; consequently the cake is not pure in the eye of the law, and has no right to be branded as such. This is counsel's opinion, and this is the reason why we changed the brand on our cake, putting on the initials of our firm so that it might be known. Again, you say that we have not proved to you that Dr. Voelcker's remarks are incorrect. We can only say that his remarks are not correct, and on what he bases them we do not know—but they are sweeping and unjust. We beg to state the cake is not very impure, and does not contain a large quantity of foreign seeds, &c. &c. We have known an analyst represent a cake to contain a large quantity of cockle-seed, when there was not a single cockle-seed in it. The cake you got from us was made of fine Libau linseed, which was twice screened, and there was no substance, foreign or otherwise, added to it. The albuminoids were not very high, between 27 and 28 per cent. It does not follow from that that the cake was very impure, as we have known 95 per cent. Calcutta linseed to show in the cake only 23 per cent. albuminoids. The oil is very high. There is $1\frac{1}{2}$ per cent. sand in the ash, which is more than we should have expected considering how the seed was screened, but the quantity is not excessive. Our cakes usually show a somewhat better analysis, but this is not a bad one. You mention the price you pay, and that you think you ought to have a pure cake. We can truly say that we have always sent you the best cake that we can make. We always buy the best seeds, and, although much the same in appearance, the cakes made from them vary considerably in analysis. We have not the slightest objection to guarantee our cakes made from 95 per cent. seed, and trust that what we have said will satisfy you.—Remaining, dear sir, yours faithfully,

"ROBERT STEPHENSON & SON."

"We may state that twice this season we have received copies of Dr. Voelcker's analysis of our cakes from customers which have been very flattering."

"March 13, 1889.

"DEAR SIR,—The writer was not here yesterday when your letter arrived. In reply we do not wish any misapprehension to arise from our remark in our letter of the 7th. We mean to say that the report could in our opinion have only been correct if starchy impurities had been added to the seed before manufacturing.—Remaining, dear sir, yours faithfully,

"ROBERT STEPHENSON & SON."

"W. Grundon, Esq.

"April 2, 1889.

"LINSEED-CAKE No. 289.

"DEAR SIR,—Since receiving the correspondence you sent me I have made a fresh and careful examination of the cake originally forwarded by you on February 13.

"As the result, I am able to affirm the accuracy of my report in every particular, and, as I have pointed out frequently, it is not the figures *alone* that mark out whether a cake is good or bad, pure or otherwise. All *oils* are not alike, nor of equal value, and an adulterated cake frequently gives as high or higher *figures* than a pure one.

"To be more specific in my remarks I affirm that the cake you sent me contains a great deal of *starchy* material, and also foreign seeds, and among these foreign seeds are the following: *rape, hemp, spurry, and cotton-seed* husk.

"It is not for me to say how or when these impurities got in, but their presence in the sample sent me I am prepared to maintain, and, if necessary, to demonstrate to yourself or any representative of the vendors, as I cannot allow my reports to be discredited in the offhand way adopted by your correspondent.—Believe me, yours faithfully,

"J. AUGUSTUS VOELCKER."

A copy of the above letter was forwarded to the makers by Mr. Grundon.

2. Mr. James Norris, of Castle Hill, Blechingley, Surrey, sent on March 1, 1889, for analysis, a sample of Russian linseed-cake (Ulanoff). About four tons of this had been purchased, at 7l. 15s. per ton net (free on rail), from Messrs. R. & J. Hewetson, 1 Catherine Court, London, E.C. Before purchasing, Mr. Norris had received from the vendors the following printed analysis :—

"ANALYSIS OF 'ULANOFF'S' LINSEED-CAKE.

Water	11.43
Oil	12.30
¹ Albuminoids	34.94
Mucilage	24.67
Indigestible fibre	11.03
Mineral matter (ash)	5.63
	<hr/>
	100.00
¹ Containing nitrogen	5.52
Containing sand . . . . .	.86

"This is pure-linseed cake, very rich in albuminous compounds.

"November 10, 1888.

"JOHN HUGHES."

Dr. Voelcker's subsequent analysis and report upon the sample sent to him were :—

"March 8, 1889.

Moisture	11.35
Oil	9.47
¹ Albuminous compounds (flesh-forming matters) .	32.75
Mucilage, sugar, and digestible fibre	30.51
Woody fibre (cellulose)	8.31
² Mineral matter (ash)	7.61
	<hr/> 100.00
¹ Containing nitrogen	5.24
² Including sand	2.65

"An impure cake, with considerable admixture of seeds other than linseed, and too much sand. "J. AUGUSTUS VOELCKER."

Mr. Norris, having previously purchased a lot of Russian cake from the same vendors, wrote to them to ask whether the two last lots were of the same parcel, and received the following reply :—

"March 13, 1889.

"SIR,—In reply to yours, the two last lots of cake we sold you were Ulanoff's make; the first 4 tons were \times 200 tons per 'Leo,' which you bought on December 10; and the second 4 tons \times 'Mabel' (*ex* 100 tons), which you bought on the 18th ultimo. Not being the manufacturers, we do not guarantee any cake, and we are not responsible after goods have left our possession, as you will see by our contract.—Yours truly,

"ROBERT & JNO. HEWETSON."

This case shows clearly that it is unsafe to rely upon the printed analyses circulated with regard to cake of a certain brand, and that purchasers should be careful to insist upon the vendors' guaranteeing the particular delivery.

3. Mr. Robert Marshall, of Ley Fields, Kneesall, Newark, sent on March 25, 1889, a sample of raw bone meal for analysis. Five tons of this had been purchased, at 5*l.* 5*s.* per ton delivered, net cash, from Messrs. J. & T. Walker, of Nottingham, who were the manufacturers. The following is Dr. Voelcker's analytical report :—

"April 2, 1889.

Moisture	18.55
¹ Organic matter	32.11
Phosphate of lime	39.71
² Carbonate of lime, &c.	8.78
Insoluble silicious matter . . . . .	.85
	<hr/> 100.00
¹ Containing nitrogen	3.63
Equal to ammonia	4.41
² Including common salt	4.32

"This is wet, low in quality, and mixed with over 4 per cent. of salt.

"J. AUGUSTUS VOELCKER."

Messrs. Walker admitted that the bones had been in stock since the previous July or August, and that in order to keep down vermin and prevent heating they had added a small quantity of salt. They offered to make a reduction of 10s. per ton.

4. Mr. F. Scott, of Rainham, Kent, sent a sample of sulphate of ammonia, price 13*l.* per ton, for analysis, on April 22, 1889, saying in his letter, "It has arrived very hard, and requires a lot of breaking, and seems to have been in the bags for a considerable time."

Dr. Voelcker's analytical report is here given:—

"April 26, 1889.									
Water.	.	.	.	.	.	.	.	.	4.10
¹ Sulphate of ammonia	.	.	.	.	.	.	.	.	69.63
Ash	.	.	.	.	.	.	.	.	23.05
Other impurities	.	.	.	.	.	.	.	.	3.22
									100.00
¹ Containing nitrogen	.	.	.	.	.	.	.	.	14.77
Equal to ammonia	.	.	.	.	.	.	.	.	17.93

"An impure sample, containing 23 per cent. of ash. Genuine sulphate of ammonia should have quite 24 per cent. of ammonia.

"J. AUGUSTUS VOELCKER."

The vendors, on receiving a copy of the analysis, wrote to Mr. Scott to express their regret, saying that this parcel had come from gasworks in London, and, as it happened, they themselves did not have it analysed. The vendors had guaranteed 24 per cent. of ammonia, and allowed 25 per cent. off their account.

5. Mr. James Tomkinson, J.P., of Willington Hall, Tarporley, sent on April 15, 1889, two samples of boiled bones for examination as to their purity, and, on hearing that "neither of them was free from admixture," applied for a fuller analysis and report. The following is the analytical report sent to him in reply:—

"May 7, 1889."											
						No. 1.	No. 2.				
Moisture	.	.	.	.	.	10.05					20.51
¹ Organic matter	.	.	.	.	.	17.56					15.59
Phosphate of lime	.	.	.	.	.	51.23					39.63
Sulphate of lime	.	.	.	.	.	1.29					7.64
Carbonate of lime, &c.	.	.	.	.	.	16.79					8.84
Salt	.	.	.	.	.	2.04					2.88
Insoluble silicious matter	.	.	.	.	.	1.04					4.91
						100.00					100.00
¹ Containing nitrogen	.	.	.	.	.	1.03					.85
² Equal to ammonia	.	.	.	.	.	1.25					1.03

"Both samples have admixture of common salt: No. 1 is further adulterated with carbonate of lime (chalk), and No. 2 with sulphate of lime (gypsum)."
"J. AUGUSTUS VOELCKER."

Both lots, No. 1 of 4 tons and No. 2 of 3 tons, had been purchased from Mr. A. Welding, of 12 Darwen Street, Blackburn, who was the manufacturer. In each case the price charged was 5*l.* 2*s.* 6*d.* delivered. On complaint being made, the maker gave an allowance at the rate of 7*s.* per ton in the case of No. 1, and 20*s.* per ton in the case of No. 2.

6. Mr. Arthur Martin, of Rempstone Hall, Loughborough, sent on April 15, 1889, a sample of manure for analysis. Two tons of this manure had been purchased from Messrs. Hamilton & Co., 98 High Street, Wandsworth, S.W., at the price of 2*l.* per ton delivered, with 5 per cent. discount for cash. The manure was called "Hamilton & Co.'s Organic Manure," and the purchaser received a printed circular, stating that the manure contained 15·81 per cent. of soluble phosphate, 1·25 per cent. of ammonia, and 10·75 per cent. of insoluble silicious matter.

Dr. Voelcker's analysis and report were as follows:—

	"May 8, 1889.
Moisture	20·55
¹ Organic matter	19·46
Tribasic phosphate of lime	·77
Oxide of iron and alumina	11·97
Carbonate of lime, &c.	8·84
Insoluble silicious matter	38·41
	100·00
¹ Containing nitrogen	·88
Equal to ammonia	1·07

"You will see that this is very different from the analysis published in the circular sent you. Instead of 15·8 per cent. of soluble phosphate, it has no soluble phosphate at all, and only $\frac{3}{4}$ per cent. of phosphate of lime. In place of 10·75 per cent. of insoluble silicious matter, it has no less than 38·4 per cent.

"I would have nothing to do with it. "*J. AUGUSTUS VOELCKER.*"

Mr. Martin complained to the makers, and ultimately the manure was returned to Messrs. Hamilton, who repaid the money and also the carriage.

7. Mr. James Farmer, of Brownhills, St. Andrews, Fifeshire, sent on April 15, 1889, a sample of linseed-cake for analysis, upon which Dr. Voelcker reported as follows:—

	" May 6, 1889.
Moisture	12.77
Oil	10.51
¹ Albuminous compounds (flesh-forming matters) .	22.31
Mucilage, sugar, and digestible fibre . . .	37.65
Woody fibre (cellulose)	6.33
Mineral matter (ash)	10.43

	100.00
¹ Containing nitrogen	3.57

"A cake containing excessive mineral matter. The ash in pure linseed-cake does not amount to more than 6 per cent.

" J. AUGUSTUS VOELCKER."

Dr. Voelcker wrote again to Mr. Farmer on May 10, stating that he had further examined the ash and found it to consist mainly of sulphate of lime (gypsum).

The makers of the cake (from whom a two-ton lot had been purchased at 8*l*. 15*s*. per ton, carriage paid) were Messrs. John Balfour & Co., Leven Mills, Fife.

Subsequently, Mr. Farmer wrote to say that "no correspondence had taken place, except that Mr. Balfour admitted that some mistake had been made in delivery of the cake, and sent a corrected invoice, reducing the price 10*s*. per ton, on account, as he said, of its having been damaged."

8. Mr. C. Warmington, of Graville Hall, Evesham, sent on April 17, 1889, a sample of "Bone Manure" for analysis, upon which Dr. Voelcker reported as follows:—

	" May 15, 1889.
Moisture	23.59
¹ Organic matter	16.48
Phosphate of lime	9.63
Carbonate of lime, &c.	40.08
Insoluble silicious matter	10.22

	100.00
¹ Containing nitrogen	1.03
Equal to ammonia	1.25

"This is not bone at all, but a refuse material not worth a third of the price you are asked for it.

" J. AUGUSTUS VOELCKER."

Two tons of this manure had been purchased at 4*l*. 5*s*. per ton delivered at Evesham, the vendor being Mr. John Busby, Rock Hill, Chipping Norton, by whom it was invoiced as "Bone Manure."

In reply to enquiries, Mr. Warmington made the following statement about the manure and the arrangement finally arrived at:—

"When it arrived I sent sample to you. On receipt of

reply I wrote him (Mr. Busby), and he requested it to be put on rails again to his order, which I did."

9. Mr. Thomas Rogerson, of Heath Side Farm, Cheadle, Manchester, sent on May 7, 1889, a sample of manure described as "Bone Phosphate." The material had been purchased from the Manchester Phosguano Co., 41 Corporation Street, Manchester, who were the manufacturers; and when sending it for analysis Mr. Rogerson wrote:—"It was represented to me to be worth 3*l.* 10*s.* per ton, but owing to the Local Authority condemning the works as a nuisance, they were selling at 35*s.* per ton, in order to clear out."

Dr. Voelcker gave the following analytical report:—

		" May 24, 1889.
Moisture	. . . . .	29·61
¹ Organic matter	. . . . .	6·64
Phosphate of lime	. . . . .	7·92
Sulphate of lime, &c.	. . . . .	48·78
Insoluble silicious matter	. . . . .	7·05
		100·00
¹ Nitrogen	. . . . .	·14
Equal to ammonia	. . . . .	·17

"There is nothing to warrant this, a refuse material, being called bone phosphate; it has only 8 per cent. of phosphate, and practically no ammonia. 10*s.*, instead of 3*l.* 10*s.*, would be more like its value; but I would prefer to have nothing to do with it.

"J. AUGUSTUS VOELCKER."

10. Mr. R. S. Balden, of The Grove, Hanging Heaton, near Dewsbury (afterwards of Hollinghurst, Netherton, Wakefield), sent on May 9, 1889, a sample of oil-cake for analysis. Two tons had been purchased from the Dewsbury Pioneers' Industrial Society, Limited, at 9*l.* per ton delivered at the farm, and Mr. Balden said that he would probably receive a discount of 2*s.* 8*d.* in the pound at the half-year when the profit was declared. Mr. Balden could not obtain from the Dewsbury Society the name of the manufacturers, but stated that the cake was branded "D. S. Cake," and was made in Hull.

Dr. Voelcker's analysis and report were:—

		" May 24, 1889.
Moisture	. . . . .	11·65
Oil	. . . . .	9·73
¹ Albuminous compounds (flesh-forming matters)	. . . . .	25·25
Mucilage, sugar, and digestible fibre	. . . . .	31·33
Woody fibre (cellulose)	. . . . .	11·43
² Mineral matter (ash)	. . . . .	10·61
		100·00
¹ Containing nitrogen	. . . . .	4·04
² Including sand	. . . . .	4·65

"A dreadfully bad cake, adulterated with rape and other seeds to an enormous extent, and having over 4 $\frac{1}{2}$ per cent. of sand.

"J. AUGUSTUS VOELCKER."

The makers as well as the vendors refused to make any allowance.

11. Mr. A. P. Ashburnham, of Broomham, Hastings, sent on June 20, 1889, a sample of decorticated cotton-cake. The price of the cake was 7*l.* 5*s.* a ton delivered, the vendor being Mr. Albion Thorpe, of Battle.

Dr. Voelcker's analysis and report were as follows :—

		July 3, 1889.
Moisture		10·64
Oil		10·61
¹ Albuminous compounds (flesh-forming matters)		31·44
Mucilage, sugar, and digestible fibre		34·29
Woody fibre (cellulose)		6·13
Mineral matter (ash)		6·89
		100·00
¹ Containing nitrogen		5·03

"I find in this cake a large amount of rice and rice-meal with which the cake is adulterated. This causes the cake to appear very low in nitrogen compared with genuine decorticated cotton-cake.

"J. AUGUSTUS VOELCKER."

Mr. Ashburnham wrote subsequently :—"I always ordered decorticated cotton-cake. After the veterinary surgeon expressed his opinion that it was the cake that had upset my sheep, I accused Mr. Thorpe of selling me an adulterated cake, when he admitted that there was some rice in it, put in for the purpose of making it soft, but denied that there was anything injurious in it."

NOVEMBER 1889.

1. Mr. E. L. Rowcliffe, of Hall Place, Cranleigh, Guildford, sent for analysis on May 28, 1889, a sample of linseed-cake, which, while not guaranteed pure, was stated to be so, and bought at 7*l.* per ton on rail at London. Dr. Voelcker reported :—

		June 13, 1889.
Moisture		12·69
Oil		10·11
¹ Albuminous compounds (flesh-forming matters)		27·06
Mucilage, sugar, and digestible fibre		28·54
Woody fibre (cellulose)		13·46
² Mineral matter (ash)		8·14
		100·00
¹ Containing nitrogen		4·33
² Including sand		1·64

"The linseed-cake is a very bad one, and is an adulterated cake. The fibre is very high, and the mineral matter excessive in amount. It is a cake I would have nothing to do with.

"J. AUGUSTUS VOELCKER."

On account of there being no explicit guarantee nothing further was done.

2. Mr. J. Godman, of Park Hatch, Godalming, sent on July 16, 1889, a sample of linseed-cake, a ton of which had been purchased, at 8*l.* delivered, from a London firm of cake manufacturers. The following analysis was returned:—

		July 31, 1889.
Moisture	.	11.15
Oil	.	10.21
¹ Albuminous compounds (flesh-forming matters)	.	25.56
Mucilage, sugar, and digestible fibre	.	30.42
Woody fibre (cellulose)	.	13.68
² Mineral matter (ash)	.	8.98
		100.00
¹ Containing nitrogen	.	4.09
² Including sand	.	2.03

"Not a pure cake. It has too much woody fibre, and also admixture of foreign seeds.

"J. AUGUSTUS VOELCKER."

3. Mr. M. Falcon, of Horstead Hall, Norwich, sent on June 22, 1889, on behalf of Sir Edward Birkbeck, a sample of linseed-cake, of which half a ton had been purchased from Mr. Robert S. Amies, of Coltishall, the price being 8*l.* 10*s.* per ton. Dr. Voelcker's report was:—

		July 3, 1889.
Moisture	.	11.58
Oil	.	10.37
¹ Albuminous compounds (flesh-forming matters)	.	21.94
Mucilage, sugar, and digestible fibre	.	39.16
Woody fibre (cellulose)	.	8.57
² Mineral matter (ash)	.	8.38
		100.00
¹ Containing nitrogen	.	3.51
² Including sand	.	3.91

"A bad impure cake.

"J. AUGUSTUS VOELCKER."

4. Mr. W. H. Webb, of Cranmere, Bridgnorth, forwarded on June 14, 1889, a sample of dissolved bones, stating that he had bought 3 tons as Pure English Dissolved Bones containing 32 per cent. of phosphates and 3 per cent. of ammonia, the price being 5*l.* 15*s.* per ton delivered. Dr. Voelcker's report was:—

		July 11, 1889.
Moisture		11·95
¹ Organic matter and water of combination		31·58
Monobasic phosphate of lime		15·79
Equal to tribasic phosphate of lime (bone phosphate) rendered soluble by acid		(24·72)
Insoluble phosphates		4·61
Sulphate of lime, alkaline salts, &c.		34·30
Insoluble silicious matter		1·77
		<hr/> 100 00
¹ Containing nitrogen		2·87
Equal to ammonia		3·48

"This is nearly up to the guaranteed analysis, but is certainly not Pure Dissolved Bones. "J. AUGUSTUS VOELCKER."

This manure Dr. Voelcker found on examination to contain some quantity of ground hoofs or horn mixed with it. Three tons of the manure had been supplied by Mr. F. D. Gibbons, of Sun Street, Horsely Fields, Wolverhampton, the manufacturers being Messrs. Morris & Griffin, Ceres Works, Wolverhampton. Previous to the purchase Mr. Gibbons, the vendor, contracted in the following terms:—"I will deliver you pure Dissolved English Bones in first-rate condition at 5*l.* 15*s.* per ton, at Madeley Market Station, carriage paid; nothing but pure English bones and acid only." Subsequently, on receiving the analysis, the vendor protested that he had sold a genuine article, writing as follows:—

"To W. H. Webb, Esq., Cranmere, Bridgnorth.

"July 13, 1889.

"DEAR SIR,—In reply to yours of this morning, please give Dr. Voelcker all the particulars he asks for, and say that the dissolved bones you had from me are pure, and that I am prepared to prove it.—Yours truly,

"F. D. GIBBONS."

Meantime the following correspondence ensued between Dr. Voelcker and the makers:—

"Ceres Works, Wolverhampton: July 13, 1889.

"DEAR DR. VOELCKER,—A few weeks ago we sold to a firm in the trade a few tons of *pure* dissolved bones. Mr. Gibbons sold them to a Mr. Webb; he has sent a sample to you, and in a note you say, 'they certainly are not pure dissolved bones.' Now it is most annoying to us, as we can absolutely prove them to be so, and as Mr. Gibbons saw the writer himself he guaranteed them such, and he personally (Mr. Fuller) saw that they were filled up from the right heap. They were taken from a heap made early in the season, so as to dry, and great care taken in dissolving them, as we do a large trade in them, and secure a chain of evidence in case of anything of the kind happening. Our manager is prepared to swear that no kind of mineral phosphate was used.

"You have evidently mistaken the sample.—Yours truly,

"MORRIS & GRIFFIN."

"Part of the bones were whales bones from the saw-mill, which produces fine white dust, and these contain 55 to 60 per cent. phos., and 5 to 6 per cent. ammonia.

"Messrs. Morris & Griffin.

"July 23, 1889.

"DEAR SIRs,—I have referred to the analysis made for Mr. Webb, and also to the original sample sent to me by that gentleman, which I have still by me.

"I am quite satisfied as to the correctness of my report on the particular sample which was submitted to me, and would point out to you that I nowhere affirmed that the manure was made up with mineral superphosphate.

"There are, however, as you are aware, other constituents besides the phosphates which have to be taken into account, and it is in respect of the nitrogenous ingredients that my report was worded.—Believe me, yours faithfully,

"J. AUGUSTUS VOELCKER."

"Ceres Works, Wolverhampton :

"Messrs. Voelcker & Sons, London.

"July 25, 1889.

"DEAR SIRs,—In reply to your favour of 23rd. There is no organic matter whatever, except what is derived from bones in dissolving ; the only other material that we use at all is one shovel full of very fine ground hoofs to the barrow when going through the disintegrator, to prevent the clogging from the natural greasiness of the bones. This, we consider, from a bone source, the very best material we can use for the purpose, and really costs us twice as much as bones do.—Yours truly,

"MORRIS & GRIFFIN."

"Messrs. Morris & Griffin, Wolverhampton.

"July 30, 1889.

"DEAR SIRs,—Your letter of the 25th inst. quite confirms my observations and examination of the sample which Mr. Webb submitted to me, and admits the correctness of my report to that gentleman. I certainly regard the use of ground hoofs as an admixture, and as not entitling a manure such as you describe to be called 'Pure Dissolved Bones.'

"The material, in the case at least of the sample sent to me, was, I should add, not at all finely ground.—Yours truly,

"J. AUGUSTUS VOELCKER."

"Cranmere, Bridgnorth, Salop : October 16, 1889.

DISSOLVED BONES, No. 1115.

"DEAR SIR,—In reply to your inquiry as to the manufacturer of the above, Mr. Gibbons called on me yesterday to say that Messrs. Morris & Griffin, of Wolverhampton, are the manufacturers, and that they supplied the bones direct to me from their works, to Mr. Gibbons' order, and in his bags, he (Mr. Gibbons) having nothing to do in the manufacture of them.

"Mr. Gibbons showed me the correspondence Messrs. Morris & Griffin have had with you on the matter ; he most emphatically denies any attempt to adulterate the bones, and wished me to ask you these two questions :—

"1. Did you find any admixture in the sample detrimental to the character of dissolved bones ?

"2. Did you consider them (as per sample) worth the price charged (as per invoice sent you) ?

"Your reply will greatly oblige, as all interested are most anxious to have the matter settled.

"Mr. Gibbons spoke about the technicality of the word 'pure' in relation to dissolved bones, as he says none can be absolutely pure, on account of their requiring some drying substance to work them through the disintegrator,

"Mr. Gibbons also wished me to say that in case you lay the matter before the Council that you will give him a chance to defend himself there.

"All I wish now to know is: Has there been anything added to deteriorate the quality of the bones, or other than was absolutely requisite to use in their manufacture.—Awaiting your reply, I remain very truly yours,

"Dr. J. A. Voelcker."

"W. H. Webb."

"W. H. Webb, Esq., Cranmere, Bridgnorth.

"Oct. 17, 1889.

DISSOLVED BONES, No. 1115.

"DEAR SIR,—I thank you for your letter, which now gives authoritatively the information as to who the manufacturers were, and that the manure supplied to you came direct from their works.

"In answer to your question, I beg to say, firstly, that I *did* find in the sample you sent me of what was supplied to you as *pure dissolved bones*, material which was not dissolved bones and constitutes an admixture detrimental to the character of pure dissolved bones; secondly, my enquiries were addressed to you not on the ground of the money-value of the manure, but on the ground of its not being what it was represented to be. At the same time I have no hesitation in saying that, by the admixture, the manure was made to appear, according to the analysis, to have a value which it would not practically have had to the farmer purchasing it, to the same extent as if it had been derived entirely from bones and acid.

"Mr. Gibbons's statement as to there being no such thing as *Pure Dissolved Bones* is quite incorrect, and it has been clearly laid down and agreed by manure manufacturers, since the passing of the Merchandise Marks Act, that *Pure Dissolved Bones* should consist of bones and acid only, without any admixture.—Yours faithfully,

"J. AUGUSTUS VOELCKER."

5. Mr. John Harrison, of the Royal Midland Seed Warehouse, Market Place, Leicester, sent on September 5, 1889, a sample of linseed-cake which was to be used on his own farm, and upon which Dr. Voelcker reported:—

"September 14, 1889.

Moisture	11.93
Oil	9.01
¹ Albuminous compounds (flesh-forming matters)	23.06
Mucilage, sugar, and digestible fibre	37.04
Woody fibre (cellulose)	8.38
² Mineral matter (ash)	10.58
	100.00
¹ Containing nitrogen	3.69
² Including sand	5.20

"A grossly impure cake. It is full of seeds other than linseed, and has over 5 per cent. of sand. A very bad cake indeed.

"J. AUGUSTUS VOELCKER."

Of this cake 4 tons had been purchased, at 6*l.* 17*s.* 6*d.* a ton, at Hull, from Messrs. W. R. Cross & Co., High Street, Hull, the manufacturers.

Mr. Harrison stated that the cake had been sold to him at

trade price, and made from seed not dressed; that the manufacturer was an old acquaintance, not making it up to any standard of purity, but saying that it was a useful cake.

6. Mr. James Myatt, of Burston Villa, Sandon, near Stone, Staffordshire, sent on September 10, 1889, a sample of River Plate linseed-cake, purchased from Messrs. Jellico Calthrop & Co., Liverpool, upon receiving from them the following circular:—

[COPY.]

"Liverpool: August 28, 1889.

"DEAR SIR,—We beg to hand you herewith sample of a new importation of River Plate linseed-cake just arrived. The analysis at foot shows it to be a cake of very great richness and purity. We can offer it at 7*l.* 5*s.* per ton net cash free to carriers, subject unsold and prompt reply by telegram. It would make excellent meal.—Yours truly,

"JELICO CALTROP & Co."

ANALYSIS.

Moisture	13.50
Oil	11.57
¹ Albuminous compounds	34.87
Starch, mucilage, sugar, &c.	27.56
Indigestible woody fibre	6.80
² Mineral matters (ash)	5.70
	<hr/> 100.00
¹ Containing nitrogen	5.5
² Containing sand . . . . .	.55

Mr. Myatt complained that the cattle did not care to eat it, and further that it was mixed up with hair and sacking.

Dr. Voelcker's report was:—

"September 18, 1889.

Moisture	10.87
Oil	9.31
¹ Albuminous compounds (flesh-forming matters)	33.87
Mucilage, sugar, and digestible fibre	31.88
Woody fibre (cellulose)	7.84
Mineral matter (ash)	6.23
	<hr/> 100.00
¹ Containing nitrogen	5.42

"A cake adulterated with earth-nut.

"J. AUGUSTUS VOELCKER."

The vendors allowed a reduction of 10*s.* per ton.

This case emphasises the illustration given in the last report of the unreliability in many cases of printed circulars issued regarding linseed-cakes, and the need of insisting upon each separate delivery being guaranteed *pure linseed-cake*.

XXXVI. *The End of the Second Series of the Journal.*

By the EDITOR.

THE issue of this half-yearly Part completes the last volume of the Second Series of the Journal, which, with the earlier Series, makes up a total of fifty goodly volumes. From its commencement in 1839 until now, the Journal has not only supplied the members from year to year with particulars as to the proceedings of the Society in its varied spheres of usefulness, but has chronicled and recorded the progress made in agricultural knowledge and practice, affording information derived from the most trustworthy sources on almost every conceivable topic of interest to those who are engaged in the varied pursuits of agriculture. In the words of Earl Cathcart (Vol. X. 1874, page 527), the Journal has been "a half-yearly epistle from Hanover Square to the agricultural world; the record for the focus of the widest possible induction—a bond of union that unites the members of a great national Society."

The twenty-five volumes of the Series which now ends form a unique compendium of agricultural literature, and reflect all the varying phases of agricultural opinion during the past quarter of a century. They contain discoveries which have become historic, and writings which have become classical. The presiding genius, so to speak, of the First Series of the Journal was Mr. Philip Pusey. The Second Series commenced under the scarcely less potent influence of Mr. (afterwards Sir Harry) Thompson. In the last volume of the First Series Mr. Thompson had written a chronicle of "agricultural progress and the Royal Agricultural Society," which, like Mr. Pusey's article in the first volume of all, forms a landmark for the historian. At the time the first volume of this Series appeared, in 1865, Mr. Thompson had been the guiding spirit of the Journal for ten years, having been appointed Chairman of the Journal Committee in 1855, when the continued indisposition of Mr. Pusey (ending the same year in his death) had compelled him to resign that office. Mr. P. H. Frere, of Cambridge, was the paid Editor working under Mr. Thompson, and the following gentlemen constituted the very strong Journal Committee of the period:—

Earl Cathcart
Earl Fortescue
Right Hon. J. E. Denison, M.P.
(afterwards Viscount Ossington)
Sir J. V. Shelley, Bart., M.P.
Sir J. V. B. Johnstone, Bart., M.P.
Sir E. C. Kerrison, Bart., M.P.
Sir A. K. Macdonald, Bart.

Mr. T. Dyke Acland (now the Right
Hon. Sir Thos. Acland, Bart.)
Mr. Edward Holland, M.P.
Mr. C. Wren Hoskyns
Mr. Richard Milward
Mr. H. S. Thompson, M.P.
Mr. Owen Wallis

Of these thirteen gentlemen, eight have died whilst holding office under the Society, two have retired, and only three—Earl Cathcart, Sir Thomas Acland, and Sir Archibald Macdonald—now remain on the Council. Earl Cathcart—who holds with so much advantage to the Society the office of Chairman of the Journal Committee—is the only Member of the Council who has been directly associated with the Journal during the whole period covered by the Series.

Mr. Thompson's intimate connection with the Journal lasted for eighteen years, and did not finally cease until December 1873, when he resigned his position on the Committee on the ground of ill-health. At a Council meeting held on December 10, 1873, Earl Cathcart in the chair, the following resolution was unanimously passed, on the motion of Viscount Bridport, seconded by Mr. Randell:

"The Council cannot accept the resignation of Mr. Thompson as a member of their committees without expressing their sincere appreciation of the valuable assistance he has rendered, not only to this Society, but to Agriculture in general. The regret which the Council feel at the loss of his valuable services is deepened by the cause of his retirement; and, in accepting his resignation, the Council beg to assure him of their sympathy with him in his illness, and of the grateful recollection which those who have worked with him will always entertain of his earnest and eminent labours in the service of the Royal Agricultural Society."

At the next meeting of the Journal Committee, Mr. John Dent Dent, who had since November 1872 been acting as Chairman of the Committee during Mr. Thompson's illness, was appointed Chairman, and held this office until his year of Presidency in 1881-2, when Earl Cathcart was elected to the position.

It has been well and truly said that the Society has been fortunate in many things, and most fortunate of all in having been able to command at all times the aid of able men who have devoted their thoughts, time, and energies to its service, without hope or expectation of any other reward than the knowledge that they were fostering the general advancement of English agriculture, which is the express Charter-object of the Society. That since the very commencement of the Journal in 1839 there should have been only four changes in the Chairmanship of the Journal Committee is a sufficiently eloquent testimony to the value of the services which Mr. Pusey, Sir Harry Thompson, Mr. John Dent Dent, and Earl Cathcart have rendered to the Journal and to the Society at large.

In 1868, when only four volumes of the Series had appeared, the Society lost by death its Editor, Mr. Frere, and during the interregnum which occurred before the appointment of the new Editor, two numbers of the Journal were brought out by Mr.

Josiah Goodwin, then, as now, the Editor of the Bath and West of England Society's Journal. Mr. Goodwin is indeed one of the few who still survive of those who were associated with the earlier volumes of the Series. At the beginning of 1869 the late Mr. H. M. Jenkins was appointed to the conjoint offices of Secretary and Editor, and this arrangement has since been continued, the Secretary of the Society being responsible under the Journal Committee for the editorship of the Journal. Thus there have been three changes of Editor during the twenty-five years; but the guidance of the Journal Committee has secured throughout that continuity of policy and record which it has been one of the principal endeavours of the Journal to maintain.

There is not a department of agricultural science or practice which has not been dealt with more or less exhaustively in the Series now closed. The cultivation of the land, the crops which it bears, the conditions, meteorological and otherwise, which affect it, and the insect foes which attack it and its produce, form the subject of articles which are all instructive, and many of which contain absolutely new facts. The growing of wheat, for example, has presented itself in a novel light since Lawes and Gilbert published their reports on its continuous cultivation on the same land (Vol. XXV. 1st Series: Vol. XX. 2nd Series), as a part of the unrivalled series of investigations which for nearly half a century have been carried on at Rothamsted, and for the perpetuation of which Sir John Lawes has now munificently provided. Such articles, again, as those by Dr. Watt and Mr. W. E. Bear on Indian Wheat, published last year, give the home-grower information which cannot be otherwise than invaluable to him as to the competition of foreign rivals in what was once regarded as the sheet-anchor of British agriculture.

In the growth of wheat, and indeed of all cereal crops, the teachings of Rothamsted have recently been usefully supplemented by the annual reports on the experiments at Woburn, which have for the last twelve years been carried out by the Society itself through the liberality of the Duke of Bedford. On all matters of agricultural chemistry the scientific papers of the late Dr. Augustus Voelcker, and of his son and successor as Consulting Chemist, have kept the members fully informed; and the annual reports on the work of the laboratory have each year grown in interest and value. Undoubtedly one of the most important steps ever taken by the Society in the general interests of the agricultural community was the determination arrived at by the Council, in 1870, to publish in the Journal and in the agricultural press, quarterly

reports of the Chemical Committee on cases of impure manures and feeding-stuffs, with the names of the dealers by whom the substances analysed had been supplied. Obviously this publication involves a certain amount of risk to the Society; but the members at large, and agricultural associations throughout the country, have unanimously and heartily approved the course pursued by the Council for the general welfare. And if the issue of these reports has been thus appreciated by purchasers, it cannot be doubted that its effect upon a certain class of manufacturers and dealers has made their publication beneficial to the farmer, by restricting the practice of selling inferior, "mixed," and adulterated manures and feeding-stuffs under misleading names.

The admirable series of reports on the farm competitions, which commenced in Vol. VI., have conveyed much practical information as to the methods of successful farmers all over England; and amongst articles specially referring to particular crops may be mentioned that of Earl Cathcart on the Potato in Vol. XX., and those by various writers on Flax and its cultivation. The reports emanating from Rothamsted on the valuation of unexhausted manures (Vols. XI. and XXI.) have been accepted as a standard for farm practice, and their results have now become the commonplaces of agricultural knowledge.

The management of grass-land has been frequently dealt with in the Journal during the past quarter of a century, Mr. H. S. Thompson having in Vol. VIII. written an admirable contribution on the subject, which he had made altogether his own. The article by Mr. Faunce de Laune in Vol. XVIII. not only gave an immense impetus to improvement in the quality of grass seeds, but also aroused a controversy as to the value of ryegrass, which is still a matter of discussion. Professor Fream wrote in Vol. XXIV. an account of certain experiments conducted by him on the herbage of old grasslands, and Mr. J. A. Caird in the same volume gave some recent experiences in laying down land to grass. The work done by Mr. Carruthers, as Consulting Botanist, has been largely in connection with seeds for permanent or temporary pastures, and his periodical reports in the Journal, commencing with his appointment in 1871, have indicated a growing appreciation by farmers of the importance of the purity of seeds.

The annual reports of the Society's indefatigable Consulting Entomologist, Miss Eleanor Ormerod, have dealt with natural history questions which are of immediate importance to the farmer; and the timely advice which Miss Ormerod has published in the Journal and elsewhere on such subjects as the

Hessian fly and the warble maggot has undoubtedly done much to direct public attention to the necessity of protective measures against the ravages of insect pests generally.

The Journal has in part guided and in part reflected the activity in subjects relating to the breeding and feeding of stock, which has been one of the most notable features of the past two decades. The reports published year by year on the Live Stock exhibited at the Country Meetings, while having perhaps their chief primary interest for breeders and exhibitors, have had a value also for the general reader. Occasionally there have been articles dealing with particular varieties of stock, such, for instance, as the paper by Mr. H. H. Dixon on the rise and progress of Shorthorns (Vol. I.); that by the late Mr. James Howard on Pigs (Vol. XVII); and that by Mr. Thornton on Jersey Cattle (Vol. XVII.). The article by Earl Cathcart (Vol. XIX.) on half-bred horses for field and road did much to direct, if not indeed to originate, the movement for the breeding of better horses and more of them, which has now been taken under the fostering care of a Royal Commission and of two or three special associations. In Vol. XIV. Mr. Henry Evershed wrote an article on the early fattening of cattle, which first gave publicity to the attempts of stock-breeders to attain that system of early maturity which has since become their guiding principle.

The melancholy subject of cattle disease has occupied much of the Society's attention, and has been the theme of many articles in the Journal. The second and third volumes appeared when the subject of rinderpest was engrossing all thoughts, and an elaborate scheme of national cattle insurance was propounded by Dr. Farr in Vol. II. Contributions by Professors J. B. Simonds and G. T. Brown on various veterinary subjects, and an admirable article by Dr. George Fleming on Pasteur and his work (Vol. XXII.), have kept the members well-posted in all the latest researches in the science. The paper written by Professor Brown for Vol. XVIII., on "Dentition as indicative of the Age of Farm Animals," materially assisted in placing upon a scientific basis the rules for ascertaining the ages of stock. In Vols. XVII., XVIII., and XIX., Professor A. P. Thomas wrote that marvellous fairy-tale of science which we now know as the Life History of the Liver Fluke.

Several articles, notably those by Professor Sheldon (Vol. XIII.), by Major Craigie (Vols. XXIII. and XXV.), and by Mr. John Clay, jun. (Vol. XXV.), have dealt with the increasingly important subject of the importation of meat, and the present number of the Journal contains an article by Mr. Albert Pell with reference to the weighing of live-stock. The question of

Ensilage, which came suddenly to the front in this country about 1882-3, was promptly taken up in the *Journal*, a report by Mr. Jenkins on its practice, and an article by Dr. A. Voelcker on its chemistry, appearing in Vol. XX. In Vol. XXII. also appeared a lengthy report of the Judges on the competition for Sir Massey Lopes's prizes for silos and silage-stacks, and the subject has been brought down to date by Mr. Kains-Jackson in the first part of the present volume.

Another subject to which the Second Series has given much prominence is that of the improvement and extension of dairying in this country. The reports by the late Secretary on Continental Dairy-farming drew attention both to the deficiencies of home practice and to the enterprise of foreign competitors. The articles by Mr. John Chalmers Morton on "Town Milk" (Vol. IV.), and by Mr. James Long on the making of soft cheese and the growth of heavy forage crops for milk-production (Vol. XXIII.), both aroused considerable attention at the time of their appearance.

Nor must it be forgotten that the Working Dairy, which is now so popular a feature of almost every agricultural show, was initiated by this Society at the International Exhibition at Kilburn, and that more recently the Society has instituted for the award of prizes in the Dairy Classes, milking tests, the reports on which by Dr. Voelcker have added much to the interest of this department of the work of the *Journal*.

Among other articles in which the *Journal* has departed from the beaten tracks and laid down new lines on which British agriculture might develop under the changeful conditions of the times, may be noted those by Mr. Charles Whitehead on vegetable and fruit-farming (Vol. XVIII.), on the progress of fruit-farming (Vol. XIX.), and on fifty years of fruit-farming (Vol. XXV.), and that by Mr. D. Pidgeon in Vol. XXIV. on the new and—in America—important industry of fruit-evaporation.

The history of the *Journal* in connection with agricultural mechanics is in the main comprised in the reports written by experts on the implements exhibited at the successive Country Meetings of the Society. There has not indeed been an agricultural implement of any note or merit produced or invented during the past quarter of a century which has not been fully described in the *Journal*; and the reports on the exhaustive trials of implements competing for the Society's prizes and medals have ranked as the standard authorities on the subjects dealt with. Amongst these reports may especially be mentioned those by Messrs. Howard Reed, J. A. Clarke, and John Coleman,

appearing in Vol. III., on the then burning question of steam cultivation; Mr. J. A. Clarke's report in Vol. VII. on the great trials of steam-cultivating machinery at Wolverhampton in 1871; the report by Mr. (now Sir Frederick) Bramwell and Mr. James Easton on the trials of traction engines in the same year; by Mr. C. Gay Roberts in Vol. VIII. on the trials of threshing-machines at Cardiff in 1872; by Messrs. F. J. Bramwell and W. Menelaus in Vol. IX. on the trials of portable steam-engines also held at Cardiff; by Mr. John Coleman in Vol. IX. on the trials of ploughs at Hull in 1873; by Mr. G. Purves Smith in Vol. X. on the trials of drills and carts and waggons at Bedford in 1874; by Mr. John Hemsley in Vol. XI. on the trials of mowing and hay-making machines at Taunton in 1875; by Mr. J. Algernon Clarke in Vol. XIII. on the trials of reaping-machines at Leamington in 1876; by Mr. J. Hannam in Vol. XIV., Mr. John Coleman in Vols. XV. and XVIII., and Mr. Thomas Bell in Vol. XXI., on the trials of sheaf-binders at Liverpool in 1877, Bristol in 1878, Derby in 1881, and Shrewsbury in 1884; by Mr. Wm. Little in Vol. XVIII. on the trials of hay-dryers and exhaust fans at Reading in 1882; by Mr. D. Pidgeon, Sir Frederick Bramwell, and Mr. William Anderson in Vol. XXIII. on the trials of portable agricultural steam-engines at Newcastle in 1887; and by Mr. Pidgeon in Vol. XXIV. on the trials of hay and straw presses at Nottingham in 1888.

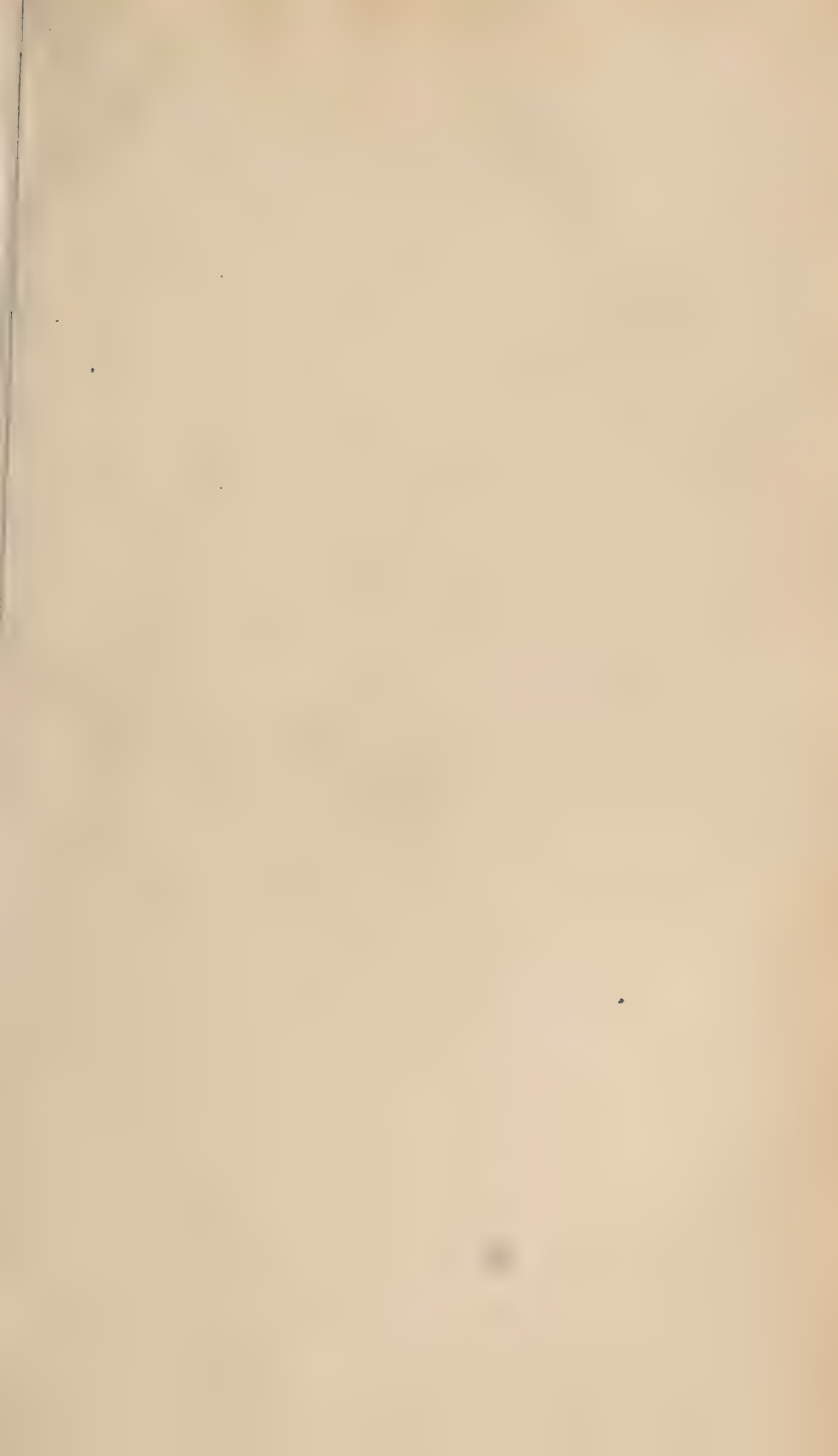
While the practice and science of agriculture have received due attention, what may be termed the ethics of agriculture have not been overlooked. Agricultural education, for example, has been the subject of numerous articles, and the condition of the agricultural labourer has been discussed in papers by Mr. Dent (Vol. VII.), Mr. H. J. Little (Vol. XIV.), and others. Mr. Dent recorded in Vol. X. some of the agricultural facts of the Census of 1871, a task which was performed for the Census of 1881 by Mr. S. B. L. Druce (Vol. XXI.). Noteworthy articles, too, were those by Mr. Clare Sewell Read on Large and Small Farms, and by Mr. Albert Pell on the Making of the Land in England, both of which appeared in Vol. XXIII.

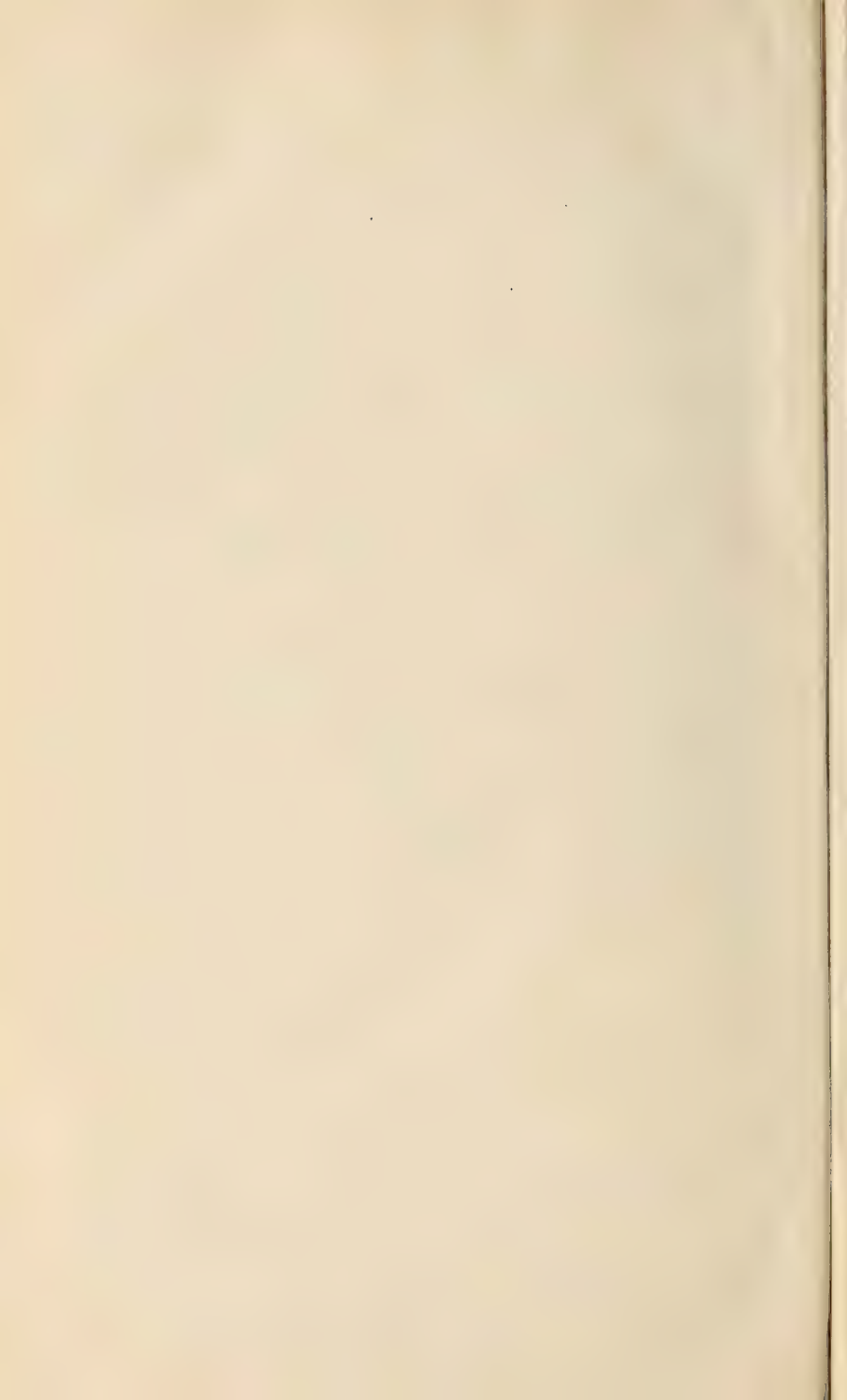
A vivid picture of the general condition of English agriculture ten years ago is contained in the Memoir which was prepared by the Society for the International Agricultural Congress held at Paris in 1878, and which appropriately found a place in Vol. XIV. of the Journal. The "General View of British Agriculture," contributed to this memoir by Sir James Caird, has since been reproduced by its accomplished author in an expanded form, and is justly regarded as one of the classics on the subject. The other articles appearing in the memoir were papers on the

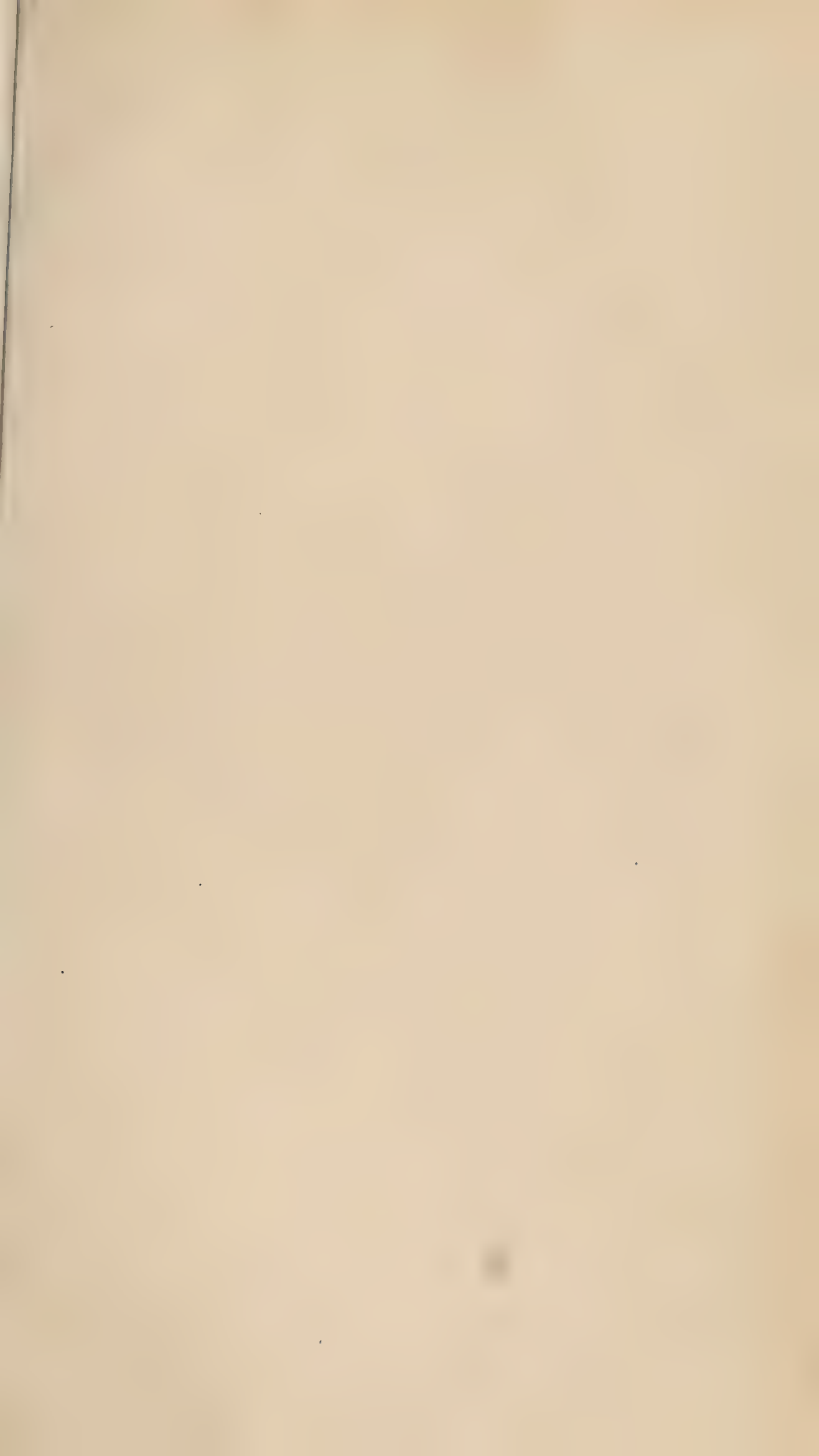
English Land Law (Messrs. Frederick Clifford and J. A. Foote), Taxation (Major Craigie), Farm Capital (Mr. Elias P. Squarey), Practical Agriculture (Mr. J. A. Clarke), Dairy Farming (Mr. J. C. Morton), Pastoral Husbandry (Mr. W. T. Carrington), The Cultivation of Hops, Fruit, and Vegetables (Mr. Charles Whitehead), The Agricultural Labourer (Mr. H. J. Little), The Influence of Chemical Discoveries on the Progress of English Agriculture (Dr. Augustus Voelcker), and the Royal Agricultural Society of England (Mr. H. M. Jenkins).

In a rapid survey of the pages of the Series, such as has been attempted above, it is scarcely possible to do more than indicate generally the wideness of the field which the Journal has covered. A glance at the complete Index to the Series, which is now in course of preparation, will be more eloquent than any words as to the faithfulness with which its pages have reflected agricultural thought during the last quarter of a century. It is hardly too much to say of the Journal that it is a cyclopædia of agriculture and a complete library of reference for the farmer.

As to the future form and appearances of the Journal, it is impossible at the moment of writing to speak definitely, as the subject is now under the anxious consideration of the Council. But, whatever may be decided, it may at least be said that, with improvements adapted to the needs and requirements of the day, and perhaps with more frequent issue, every exertion will be made in the future to carry on the Journal in the same spirit as has characterised its past, and in a manner worthy both of its distinguished traditions and of its extended influence.











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